

The Iron Age

A Review of the Hardware, Iron and Metal Trades.

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The Volga Bridge.

For many reasons Americans ought to watch industrial and commercial progress in Russia with interest. Similarity in the extent and nature of her resources has made her both a competitor and imitator of the United States. The vast plains of central and southern Russia are exceptionally fertile. Its inhabitants are struggling hard to retain and extend their markets for agricultural products in Western Europe. The farmer of our Western plains and the boor of the Russian steppes are pitted against each other. Success must depend largely upon the completeness of the facilities for shipping the product of the grain fields. As yet we are far ahead in this respect, but it seems that the Russians are fast realizing their position. They are putting forth their best efforts to utilize the advantages of modern methods of transportation. It is a curious fact that they in many details are imitating the Americans, who have in an astonishing way been identified with their progress. Ross Winans, of Baltimore, took a leading part in the early development of the railway system of the Russian empire. Alphonse Sevak revolutionized the shipping of the river Volga, the great artery of trade, by introducing the American type of river craft. In 1871 he launched a steamer called

girder was conveyed on an elaborate staging resting upon seven large barges. These were then towed between two piers by three tugs and anchored when approximately in position. The exact location was then accurately regulated by paying out or hauling in anchor chain. The barges were then gradually lowered by letting in water, until the girder rested in its proper place on the piers. Provision had been made to pump the water out of the barges in case of necessity, but the complete success in every case rendered the pumps useless. The 13 girders were taken to the piers and placed in position without an accident, and the bridge was opened to traffic.

SCIENTIFIC AND TECHNICAL.

It is stated that improvements in THE MANUFACTURE OF PAPER BOXES have been introduced lately in Boston, by which they are manufactured directly from the paper pulp. The boxes are turned out of any size or shape, perfectly seamless and of uniform thickness. After drying, the boxes are run through a second machine at the rate of 60 per minute, receiving, under a pressure of 4000 pounds, such embossing as may be necessary. From the time the paper stock is taken from the bales until the

feuille, by treating silica at a temperature of 750 to 800 degrees C. with sulphate of soda. Friedel and Sarasin have recently employed a different method. They placed in a closed steel tube lined with copper a mixture of potash, alumina and an excess of amorphous silica, water being present. After exposing the tube to a dark red heat for periods varying from 14 to 38 hours, they found that almost the entire quantity of silica was crystallized, small, quite fully developed individual crystals being obtained also.

Mr. A. InostranJeff describes, in the *Neues Jahrbuch für Mineralogie*, A PECULIAR VARIETY OF COAL which occurs on the northwestern banks of Lake Onega, Russia, in slates stated to belong to the Huronian formation. It differs in its physical, as well as its chemical, properties both from anthracite and graphite. Pure varieties show a strong metallic luster, which remains even after exposure to a dull red. Its hardness varies from 3.5 to 4, and its density at 4°C is 1.841. It is highly hygroscopic, an analysis yielding: Carbon, 95.50; hydrogen, 0.40; nitrogen, 0.41; water, 7.76; and ash, 1.01. When free from water the percentage of carbon runs up to 98.11 per cent., so that it is richer in carbon than anthracite, though it contains less hydrogen, no oxygen and much nitro-

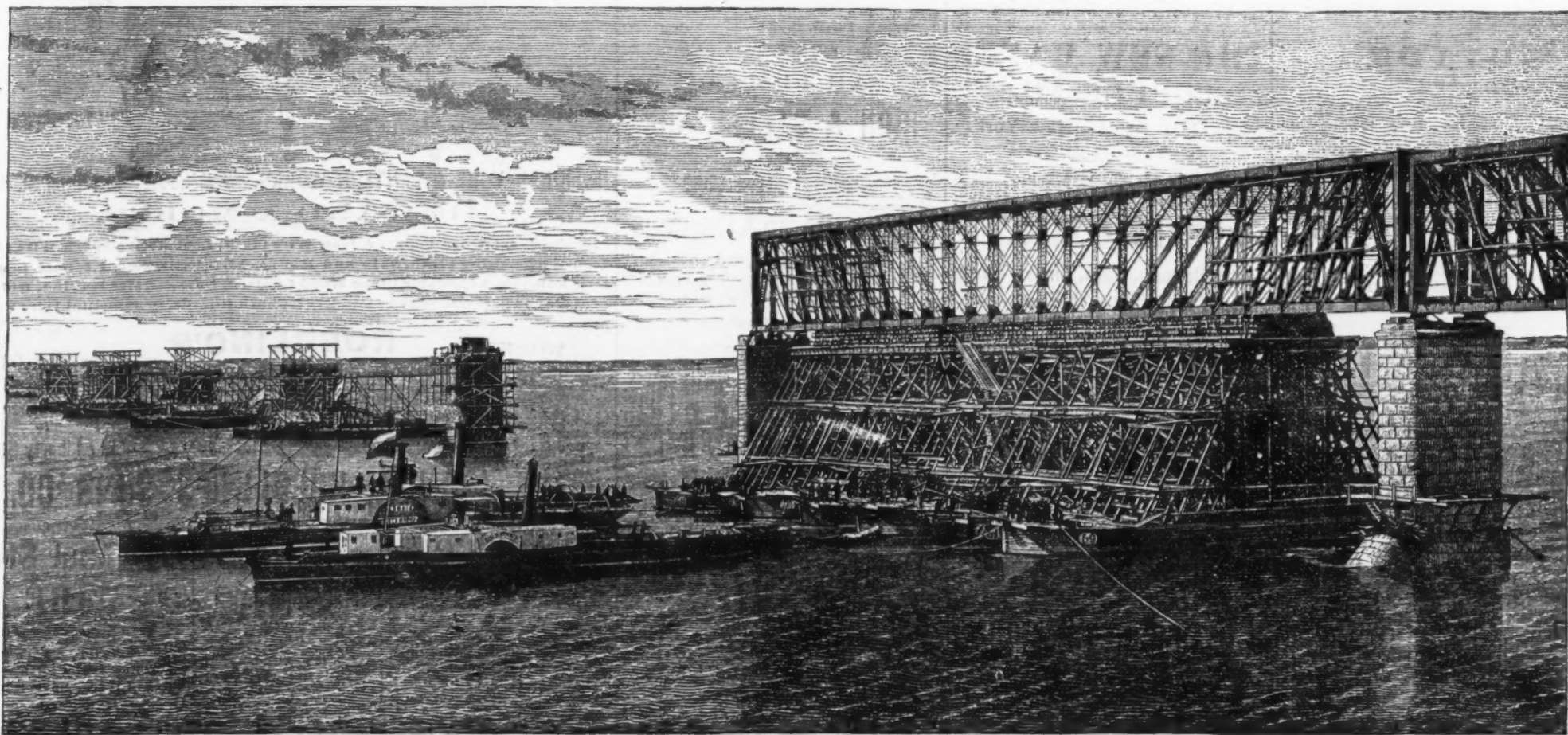
at the distance of about another 40 yards, the same thing occurred again, flame bursting from the earth. The explosions shook the adjoining houses, and damaged them from the foundations to the roof. These explosions followed each other from east to west. Fifty yards from the third explosion, a fourth explosion, made a terrific gap in the street, exposing the whole foundations of the houses, and casting up the contents of the underground cellars. These continued explosions appeared to have exhausted for some distance the explosive compound which had been admitted to the mains, for the next explosion did not occur for nearly 80 yards, where another upheaval of the street occurred, a burst of flame, the shaking of houses, and the laying bare of the foundations following in a similar manner. Between 200 and 300 yards from this spot the gas again exploded, downward as well as upward, bursting in the sewers and water-pipes, and very greatly damaging the houses, and some distance from it, the seventh explosion took place.

Early History of Cut Nails.

Thomas Atkins, a gentleman now in his 84th year, writes under date of June 25 to Mr. E. B. Chaffee, giving some interesting

exploration of the iron and coal districts of southern Russia. There can be little doubt that the first of these projects at least has been under consideration. There is, however, another hypothesis, which would explain more naturally Mr Barker's visit here. It is believed that the Government is determined to appropriate a considerable sum to the enlargement of the fleet, and it is reasonable to suppose that Mr Barker, who is backed by a powerful American syndicate, is willing to help the Government. Mr Barker, who is a Philadelphia Quaker, very much astonished Russia by the scrupulous honesty with which, under disadvantageous circumstances, he fulfilled his former contract for supplying cruisers, and he has been received here with singular favor. He was even admitted to a private audience with the Czar.

Production of Iron and Steel Works of Prussia and Saxony in 1878.—The Prussian government has just published, in the *Zeitschrift f. Berg-Hütt. u. Sal. Wesen*, the statistics of the output of the metallurgical works of that country for 1878. One hundred and sixty-three blast furnaces, working, on an average, 42.4 weeks in the year, turned out 1,568,061 metric tons of pig. The amount of manufactures of wrought iron produced was 975,136 tons,



THE VOLGA BRIDGE, ON THE SYSRAN-ORENBERG RAILROAD.

the Perowood, now the Colorado. Its success was immediate and startling, and now a number are plying on the river regularly. While the Volga is of inestimable value as a highway, it was for a long time a barrier to the extension and consolidation of the railway system of Southern Russia. Recognizing the necessity of overcoming this obstacle, the erection of a monster bridge was finally decided upon. It is located on the Sysran-Orenberg Railroad, connecting the important cities of Sysran, in the government district of Simbirsk, and of Samara, in the district of the same name. In the accompanying illustration we show a number of the river spans of this bridge in course of erection. The width of the river is nearly a mile, and the structure spanning it is carried on 12 river piers and two shore piers. The Volga River is remarkable for extraordinary spring floods, caused in part by the existence of gorges between Simbirsk and Samara. This has necessitated the building of high piers about 100 feet above mean water level, the depth of the river being in some cases more than 50 feet. The bridge was designed by Professor N. Belubski, of St. Petersburg, the contract for erecting it having been taken by C. Michailow for seven millions of silver roubles, or a little more than five millions of dollars. The foundations of the piers were made in the usual way—by means of caissons—and the masonry piers erected upon them. The girders are 364 feet long, 37 feet high, and 20 feet wide—ample for a single track of 5-foot gauge. The girders were riveted together and completed on the high right bank of the Volga. Although of such length, and although each girder weighed over 500 tons, and was to occupy a position 100 feet above the mean level of the water, Mr. Berosin, chief engineer, adopted the plan of floating it in its position. Each

perfect box is turned from the machine, manual labor is entirely avoided. By the use of one set of these machines 30,000 boxes can be produced per day, at less than one-third of the lowest market price of hand-made goods, and doing the work of 200 hands.

Mr. E. Coneschy has determined

THE POINT OF EVAPORIZATION OF ARSENIC, which he places between 449° and 450° Celsius, that temperature having been arrived at by noting that arsenic evaporated when iodine of zinc was completely melted, which takes 446 degrees, and chloride of silver, the point of fusion of which is 457 degrees, was nearly liquid.

M. Meunier has succeeded in making

ARTIFICIAL CORUNDUM AND SPINEL. The later is made by heating together to redness, in porcelain tube, chloride of aluminum and magnesium and conducting steam over them. The tube will, after cooling, contain an apparently amorphous mass, which, however, is found under the microscope to consist of minute octahedrons. Gahnite is obtained by using zinc instead of magnesium. Corundum is produced in the same manner in which Clay Lussac obtained hematite or iron glance, by the decomposition of chloride by means of steam, and Daubrée cassiterite with the aid of tin chloride. Meunier simply decomposes chloride of aluminum by means of steam, at a red heat, and obtains hexagonal plates of artificial corundum, the same substance as the sapphire, the ruby and emery.

Many different methods have been used for THE ARTIFICIAL PRODUCTION OF QUARTZ. Crystals were made by Senarmont by heating gelatinous silica with hydrochloric acid; by Daubrée, by means of the action of superheated water upon glass; by Haute-

gen. The "black earth" from Olonez is distinguished from graphite, which it resembles much, by the fact that it does not yield graphitic acid or "Brody's graphite" with a mixture of nitric and sulphuric acids, nor does it burn as rapidly as graphite.

A Gas Explosion in London.

An extraordinary accident took place recently in London, where a company had been renewing over a half of mile of gas mains. The work of laying these mains has occupied a considerable time, and was in the hands of two different contractors, the junction of the eastern and western ends being intended to be made. The undertaking was so far completed that the work of pumping gas into the mains was commenced, and consequently the gas mains, which were 36 inches across, were filled with the highly explosive mixture of gas and atmospheric air. Two men were in charge of the ends of the mains. They are both dead, so that it has not been ascertained with certainty how the charged mains were fired. It is said that the fuse was supplied by the light from one of the open gas pipes lighted to warn the drivers of vehicles against the dangers of the open ground, while others allege that a light was thrown down by a smoker. All that is known for certain is that about 7 o'clock there was at the junction of the pipes the flash of an explosion, and the rising of a vast amount of flame into the air. This was immediately followed, at about 40 yards' distance, by the upheaval of the ground, the throwing up of the paving-stones, and the rending down of the iron palings before the houses, accompanied by a rumbling like that of distant thunder. Before the beholders could turn,

data relating to the early history of the manufacture of cut nails. He writes:

In answer to your inquiries, I will briefly state that Daniel French, of Berlin, Conn., was the inventor of a machine to cut nails, and as he was not a man of sufficient means to carry out his invention, he applied to Jehoshaphat Star, of Middletown, to help him in the business of cutting nails. Star purchased a water privilege, the next below the Middlefield Falls. There Star built a dam and erected a small factory about the year 1793 or 1794, and here were manufactured the first cut nails in the United States, and perhaps in the world. The nails, after being cut, were headed by hand. Before French had perfected his machine to head the nails, he went to Cincinnati and invented a steam-engine to propel boats, and the first boat that ascended the Ohio River was propelled by his engine. Deacon Selah Goodrich has a letter in his possession giving an account of the trial trip, which was a success. The deacon's mother was a sister of French. This old letter is worth a perusal. During the war of 1812 wire was manufactured at the nail works building, and after the peace of 1815 wool was carded in this building. The pistol works, lately burned down, stood a little below the nail works. I might add that the first cut nails were used with distrust; wrought nails were mixed in with them.

Yours with respect,
THOMAS ATKINS.

The St. Petersburg correspondent of the *London Standard* says: The presence here, attended by a staff of experts, of Mr. Wharton Barker, the American, has given rise to the most varied rumors concerning the introduction of the grain-elevator system, the construction of the Siberian railway, and the

and that of manufactures of steel footed up 462,507 tons, 25 converters and a like number of open-hearth furnaces being employed. The production of zinc and spelter was 94,638 tons, that of pig lead 75,000 tons and that of copper 9073 tons. Four hundred and sixteen collieries, employing 145,322 men, turned out 35,500,167 tons of coal, while 501 mines, giving work to 18,302 men, produced 8,841,366 metric tons of lignite. The iron mines of Prussia had a total output of 2,955,872 tons of ore. Works in Saxony produced 80,011 tons of pig iron, 11,462 tons of manufactures of wrought iron, 18,418 tons of manufactures of steel. The government works at Treiberg produced, besides 3853 tons of lead and manufactures of lead, 320 tons of zinc, 1545 tons of sulphate of copper and a little more than one ton of bismuth.

A New Ocean Steamer.—Messrs. John Elder & Co. have been successful in securing the contract for a screw steamer of extraordinary dimensions for the Guion line, running between Liverpool and New York. She is to be named the Alaska, and her extreme length will be 500 feet; breadth, 50 feet; and depth, 40 feet (molded), with a gross tonnage of 6400. The engines are also to be of great size, constructed on the three-cylinder principle, to indicate 10,000 horse-power. It may be remembered that Messrs. John Elder & Co. built the Arizona, a fine screw steamer, 466 feet in length, for the same line a year ago, and the success of this vessel in making rapid voyages across the Atlantic has no doubt induced the Guion Company to entrust a second order on a larger scale to the well-known Clyde firm. The Alaska will be constructed on somewhat similar lines to the Arizona, and is expected to attain even a higher rate of speed.

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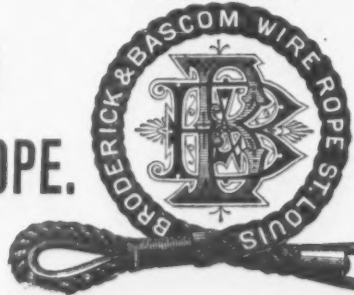
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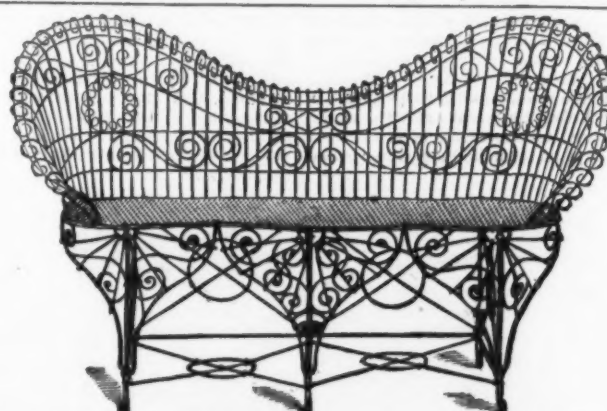
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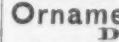
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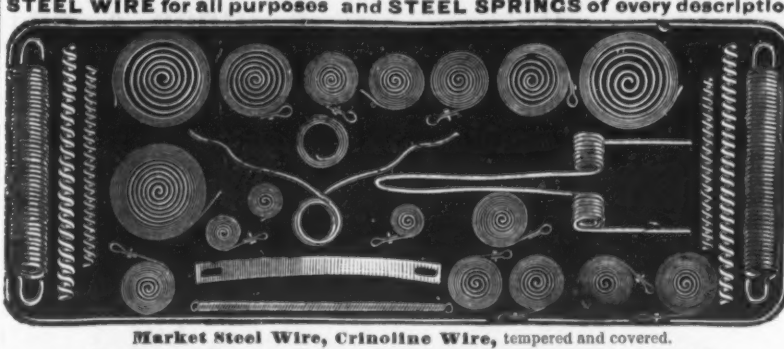
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The Utilization and Properties of Slag.

We have from time to time placed on record the developments made in utilizing blast furnace slag, a subject claiming and deserving considerable attention both in this country and abroad. A most complete and elaborate paper was read recently before a local engineering society by Mr. Chas. Wood, of Middleborough. We give below a full abstract, but consider it necessary to state that Mr. Wood does not do full justice to the work done in the utilization of slag in this country, and notably in Germany. As a record of what has been tried and accomplished in England it is, however, of high value.

The disposal of the enormous output of slag or scoria from blast furnaces has always been one of the serious difficulties of the iron trade. Taking an average of all the districts in England, for each ton of iron made, 25 cwt. of slag is produced, and from the official returns of last year of the iron smelted, no less than 8,000,000 tons of slag were produced. The space occupied by this mass, when loosely tipped, is something like 170,000,000 cubic feet, or nearly twice the size of the Great Pyramid, while the bulk of the iron occupies only one-sixth of the same space.

Blast furnace slag, as it flows from the furnace when making foundry iron, is usually of a gray color, of much the same consistency as molten glass, a substance, in many points, it greatly resembles, particularly when the more siliceous ores are being smelted. It is very fluid, and has a temperature considerably above the melting point of cast iron; in proof of which, if a piece of cold cast iron be placed in a block, or wagon of fresh molten slag, it readily melts. At this high temperature, it contains a large quantity of gas, a considerable portion of which is thrown off or exuded as the slag cools down or becomes set. So much is this the case, that a large block or ball, technically so termed, will often burst, an hour or two after being run, from the accumulation of this gas in the inside. The bursting of these balls at the ironworks is of constant occurrence, and a source of danger, caused by the liquid slag and the outside shell dropping after the ball has burst. This is partially overcome by making the workmen knock a hole through the top crust before leaving the furnaces. Again, the least derangement in working of the furnace is quite sufficient to alter the nature of the slag, and often, within half an hour, will the slag be changed from gray to a perfect black. Such a color usually indicates imperfect smelting, and the slag will be found to contain a larger proportion of iron than it should do. Such, then, is the material with which blast furnace managers have to contend, and which forms their *bête noire*.

For many years the only known use for blast furnace slag was for road-making, and for this purpose it is still largely employed. In Northamptonshire, and in certain districts of Yorkshire, the whole of the slag produced is sold at a considerable profit. These, however, are local exceptions. Perhaps the largest user of slag is Mr. John Fowler, M. Inst. C. E., engineer for the Tees Conservancy Commissioners, whose works upon the breakwater at the Tees mouth deserve to rank as some of the most interesting in the kingdom. On these constructions Mr. Fowler consumes something like half a million of tons annually. A similar class of work is also being carried on at Barrow-in-Furness, from the slag produced at the hematite furnaces in that town; but, in consequence of the large amount of lime contained in this slag, much greater care has to be taken in its selection. The slag used at the Tees Breakwater is chiefly taken away upon bogies, in blocks weighing three and a half tons each. The slag is run into these blocks, upon the wagons, at the furnaces; a case or box being placed upon the bogie for this purpose. When the slag is sufficiently "set" this case is removed, and the wagon, with the block upon it, is taken a distance of about six miles to the breakwater. A large quantity is also tipped upon a platform on the river side, in such a position that the tide completely covers it; it is then wheeled into hopper barges, belonging to and for the use of the River Tees Commissioners. In consequence of the Tees Breakwater (known as the South Gare Breakwater) being now nearly completed, and the Tees Commissioners wishing to commence the breakwater on the opposite side of the river, called the "North Gare Breakwater," Mr. Fowler, in conjunction with the author, devised a plan for shipping the bogies with the hot balls into barges, and towing them down the river to a landing-stage constructed for discharging. Each barge is constructed to carry 40 bogies, and will be about 220 tons burden. These barges will bring back the empty bogies on the return journey.

The loading of these barges at all states of the tide has naturally occupied a considerable amount of attention, and the machinery for shipment, designed by Messrs. Appleby Bros., of Southwark, and called a "Titan," has been recommended by Mr. Fowler, and generally adopted. Cantilevers, from a frame traveling on rails on the quay, overhang sufficiently to reach the outside of the slag barge, and a kind of overhead traveler runs backward and forward on these cantilevers, a distance of about 35 feet. The slag bogies are lifted and lowered by two steam-winch on the traveler, the centers of which correspond with the two lines of the rails upon the quay and upon the barge. A square shaft, running the whole length of the Titan, transmits all motions to the winches for lifting and traveling. Each winch has two drums for flat steel-wire rope, and these ropes are connected together by cross-beams, with slings for taking hold of each end of the bogies, the object being to prevent them from twisting when being lifted or lowered, and to insure their coming directly upon the lines respectively on shore and in the barge. The Titan is fitted with two lines of rails, one for full and the other for empty bogies. As already indicated, these lines correspond with those on the barge. The mode of working is as follows: When a barge-load of empty bogies are brought alongside, the bogies on the first transverse

line are landed, and the barge is warped forward until the line which has been cleared comes opposite to the line for the loaded bogies; the traveling winch then picks up a loaded bogie, traverses out with it, deposits it in the barge, at the same time picks up an empty bogie from the barge, then returns to the wharf, deposits it on the line for empties, and so on at each operation; so that the traveler takes out a loaded bogie, deposits it on the barge, and brings back an empty bogie each journey. The speeds of working are estimated to be equal to loading and discharging at the rate of 40 bogies per hour. The engine, boiler, coal bunk, feed water tank and counterweight box are fixed at the inshore end, and a platform on the traveler is provided for the driver, so that he stands directly above his work, and can clearly see each operation. One lever gives the motion for lifting and lowering, and another lever those for traveling in either direction. The whole of the work is performed by two men on the Titan, a stoker and traveler man, two men being required below to attend to the slings.

The next stage in slag utilization is the endeavor which has at various times been made of running the liquid slag, as it flows in a stream from the furnace, into molds; or, in other words, making slag castings. Such an idea, at first sight, would seem natural enough. Here, it may be said, is a material flowing to waste, in a liquid state, capable of being run into molds and of taking impressions almost equal to that of cast iron. The castings, also, when successfully made, are exceedingly durable, and even beautiful to look at. So alluring has been the idea of casting that, during the last 50 years, the Patent Office has recorded, almost annually, the attempts of some inventor impressed with the notion that he could treat this treacherous fluid successfully, or, in some way or other, make it useful in the arts. To attempt to describe these various schemes, or to give even an outline of them, would occupy far too much time, but the author thinks that the following remarks will give a general idea of the difficulties he has had to meet. The temperature at which the slag leaves the furnace is about 3000° F.; but, when brought into contact with anything cold, in the shape of a mold, it readily parts with its heat, and, in so doing, suddenly contracts. The surface contracting becomes filled with fine cracks or flaws; so much is this the case that, if allowed to become entirely consolidated in the molds, these cracks will be found to penetrate completely through the casting, and, upon exposure to the air, the casting falls to pieces. This is the more vexing, as, when slag is run into a large mass—say into a pit of sand 8 or 10 feet deep, and containing from 30 to 40 tons—there is such an enormous amount of heat accumulated that it becomes self-annealing, the outside of the mass is kept at a high temperature, and, if allowed to remain until cool, not a flaw will be found, and the slag becomes so exceedingly tough and hard that it may be quarried in the same way as granite or Whinstone, and used for street paving.

There is, however, one exception to the numerous failures in slag casting: it is known as Woodward's patent, and although there is absolutely nothing new in the process, still, through the perseverance of Mr. Dobbs, the late manager and engineer for the furnaces of Messrs. T. Vaughan & Co., a degree of success has been arrived at sufficient to enable the company which works the process to pay a fair dividend. The success has been eminently a practical one, and appears to rest mainly on two points: Firstly, in the quickness with which the castings are removed from the molds and placed in the annealing ovens, where the temperature is constantly kept up nearly as high as the melting point of slag, the heat, after the ovens are full, being so gradually lowered that the outside of the casting cools at the same rate as the inside; the contraction is thus equalized throughout, strains upon the outside are avoided, and the fine surface cracks do not penetrate much below the skin; and, secondly, upon the fact that only solid rectangular blocks, with a certain amount of bulk in them, are attempted. The blocks are made by running the liquid slag into a series of open-topped molds. The molds are of cast iron, and are held by one end upon the periphery of a horizontal wheel or table. The wheel is suspended by tie rods upon a central pillar. The molds, when being filled up, are brought in succession under the slag-runner by the man in attendance, who watches until the mold is full. When the slag has become consolidated in the molds a catch-hook is knocked up, the mold falls to pieces, and the brick drops to the ground. When they come out of these molds, although consolidated, they are still in a sort of half-molten state, and are immediately removed into annealing ovens, which are always kept at a high temperature, so that the block receives no chill—the ovens are of small size, and, when full, are sealed up and allowed to cool down by themselves. There are about 70 molds upon each machine, and the hotter these are kept the better; while, to prevent chilling of the molten slag, as it runs into the molds, they receive a thick coating or washing of chalk or lime after each casting, the lime acting as a non-conductor as well as assisting the block more readily to drop out of the mold. The casting is not allowed to remain in contact with anything which can extract its initial heat, so as to produce unequal cooling; and, as before stated, the whole success has been eminently a practical one, and reflects great credit upon those who have so patiently worked it out. Large quantities of these bricks or paving blocks are used in the North of England for crossings, stables, yards and streets; their durability, uniformity and general appearance when well set is very pleasing. From a series of tests recently made against a crushing strain, some of these blocks carried a weight equal to the hardest granite.

The next successful process for dealing with molten slag is that of Mr. Bashley Brittain's, who converts it, by a kind of compound process, into glass for bottle-making, and for many purposes where a pure white glass is not essential. The slag is taken from the blast furnace in large ladles upon wheels, in quantities of about 500 lbs. In this state it can be conveyed a considerable distance

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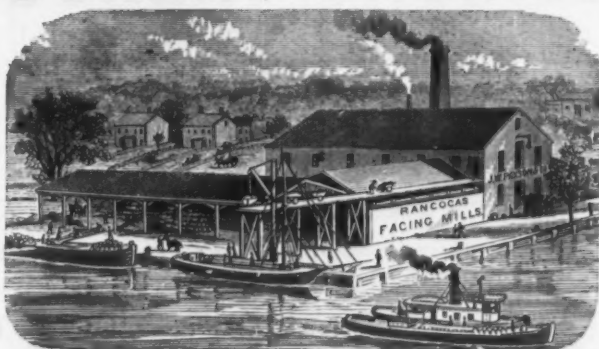
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We wish to call particular attention to our D. B. G. special

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to the glass works, where it is poured into a

Siemens regenerative gas furnace, known as

the "continuous" melting tank furnace.

The furnace is arranged to work with gas

made by a Wilson's gas producer, and is con-

sidered to be a great improvement upon the

furnace employed at the slag glass works at

Finedon. The material is fused in a melt-

ing tank, and becoming fused, flows through

a bridge into a secondary basin called the

gathering basin. The glass is withdrawn

from this basin through a series of holes by

the workmen, and fashioned into bottles or

other useful articles in the usual way. By

this arrangement, the work of charging and

withdrawing the liquid glass is continuous,

and proceeds uninterruptedly from Monday

morning till Saturday night. Messrs. How-

son & Wilson state that, with one of their

gas producers, the consumption of coal per

ton of slag glass should not exceed 10 to 12

cwt. With each charge of molten slag

into the melting tank, alkalies and sand, and

coloring or decolorizing material, are added

in proportion, depending on the quality and

color of, and the composition of, the glass

required. So far, the only slag operated

upon is that produced from the Finedon

furnaces in Northamptonshire, a very siliceous

slag, the analysis of which is as fol-

lows:

Silica..... 38.60

Alumina..... 14.7

Protoxide of iron..... 5.6

Protoxide of manganese..... 0.9

Lime..... 38.19

Magnesia..... 1.00

Titanic acid..... 1.00

Potash..... 1.58

Calcium..... 1.55

Sulphur..... 1.24

Total..... 99.93

To make bottle glass equal in quality

and appearance to French champagne and

claret glass, about 50 per cent. of slag

may be used; for plate glass, the same

proportion, or rather less of slag; but for glass

for heavier articles a much larger percent-

age can be adopted. Bottles made from

slag glass are stronger than those manu-

factured in the ordinary way from the usual

materials, and will stand from 320 to 350

lbs. per square inch; half bottles (pints)

from 420 to 450 lbs. per square inch. Slag

glass, owing to its toughness, is especially

suitable for manufacturing into tiles, cis-

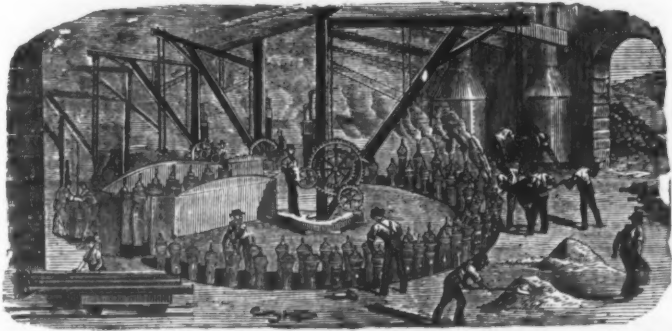
terns, plates, pipes, slates, &c., for which

glass is not now employed. The chief points

of merit claimed for the process are the

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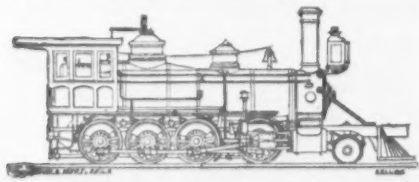
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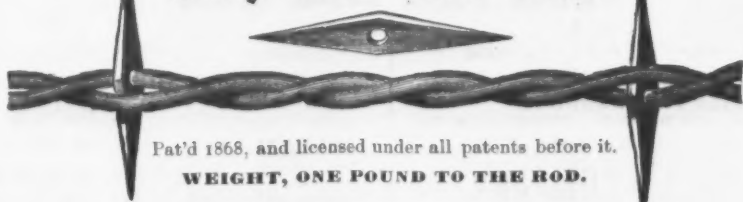
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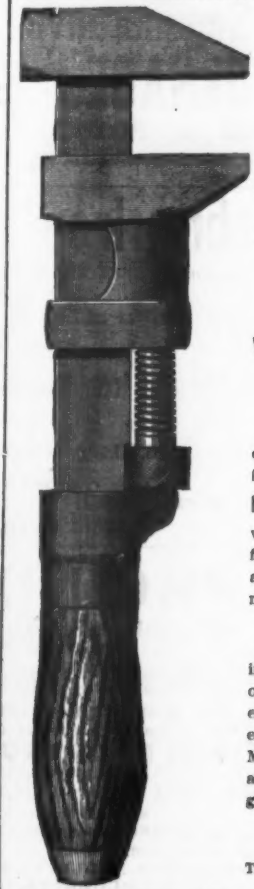
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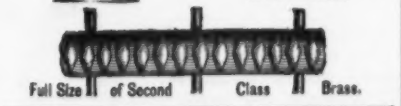
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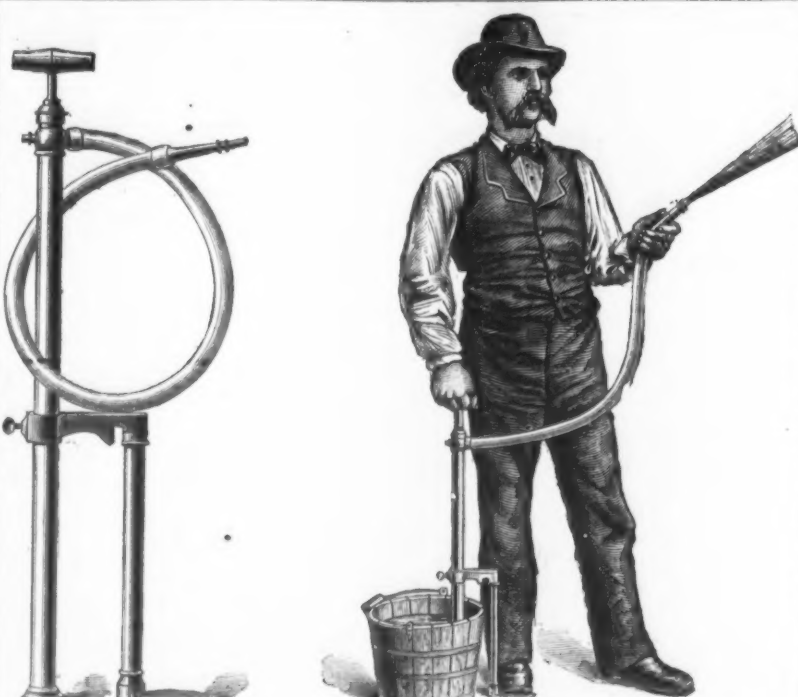
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LAMBERTVILLE, N. J.



The above cuts (Fig. 259) represent our **PATENT AQUAPULT**, so valuable a Hand Force Pump that certain competitors have made bold to infringe on same, and even to resort to the crime of plagiarism in using our cuts and trade-mark name of article to decoy customers away from our manufacture and invention; and we caution the trade and customers against purchasing this article when not made by ourselves, as we intend to protect our rights under our patent.

W. & B. DOUGLAS, Middletown, Conn.
BRANCH WAREHOUSES:
85 and 87 JOHN STREET, NEW YORK, and 197 LAKE STREET, CHICAGO, ILL.

UNION MANUFACTURING COMPANY.



The above cut represents our **PORTABLE AQUAPULT** (Fig. 114) in operation. A new and very valuable article. It will throw about 8 gallons of water per minute 50 feet high, with the power of only one hand applied. Especially adapted to washing windows, carriages, watering gardens, sprinkling streets, &c., &c. It is very light and compact. Price, complete with 3 feet discharge hose, brass discharge pipe and sprinkler, each, \$9.00. A liberal discount to the trade.

THE ABOVE STYLE OF PUMP WAS IN THE MARKET LONG BEFORE THE PARTY WHO CLAIMS THE EXCLUSIVE RIGHT TO MANUFACTURE IT HAD MADE ONE.
WE GUARANTEE OUR PUMP NO INFRINGEMENT UPON ANY PATENT WHATSOEVER, AND THE TRADE NEED HAVE NO HESITATION IN PURCHASING OF US.

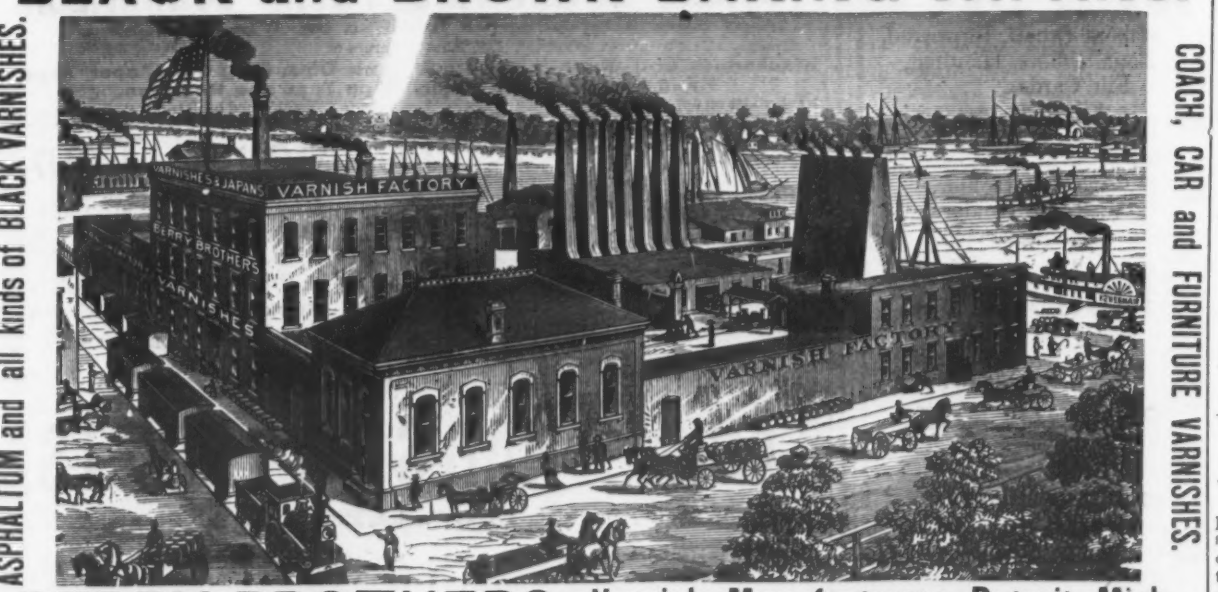
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Philadelphia "STAR" Bolt Works.

NORWAY IRON FANCY HEAD BOLTS,
Carriage & Tire Bolts. Star Axle Clips, &c.
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ESTABLISHED 1858.

BLACK and BROWN BAKING JAPANS.



BERRY BROTHERS, Varnish Manufacturers, Detroit, Mich.
CHICAGO BRANCH, 236 Lake St.; ST. LOUIS, 303 & 305 North Third St.; CINCINNATI, 72 Main St.; ROCHESTER, 116 Front St.; BALTIMORE, 100 West Lombard St.; PHILADELPHIA, 57 North Front St.; BOSTON, 141 Milk St.; NEW YORK, 279 Broadway.

tions per minute, and the water contained inside is partly carried up by the elevators, and, in falling, causes a constant rush of water to the bottom. Perforated screens, or elevators, are arranged to screen the slag from the water, and lift it to the top of the machine, where it drops upon the sand-receiving spout, and thence slides in a constant stream into wooden wagons. The spout is also perforated, to allow any water which has been carried over with the sand to return again into the machine. The perforated buckets have another important function to perform, viz., that of agitating the water. The water, in rushing to the bottom, meeting these obstructions, rolls over in a violent manner, and into this agitated water the liquid slag flows just as it comes from the furnace. The united action of the agitated water and the formation of steam scatters, as it were, the molten slag in the water into the material called slag-sand, some of which is exhibited; as also a working model of the machine. The wear and tear of this machine is very light, there being no working parts coming in contact with the sand or the heat. The heat, being taken up by the water, is thrown off in the shape of steam, which comes away in large volumes. Gray slag takes up about 20 per cent of its own weight in water. The total cost of this sand in railway trucks is about 6d. per ton. At the Tees Iron Works the author has three of these machines and two single machines generally at work.

On the Continent a kind of slag-sand has been made—prior to the adoption of the process just mentioned—by running the slag into tanks full of water, and elevating the sand by chain buckets into wagons; but the apparatus is very imperfect, and will only work slag made from forge iron, known as black slag. The application of slag-sand, in so cheap a form, to the useful arts naturally followed the production, and, after numerous experiments, extending over many months, it was decided to establish separate works in close proximity to the furnaces, where, under the author's own directions, various processes could be developed; and, in 1876, the first manufactory of the kind was started. Although in Georgemarienhütte, in Hanover, under the direction of Herr Luerman, a process of brickmaking was started a few months previously.

The remarkable setting properties of slag in a state of subdivision has attracted the attention of scientific men for many years, and many schemes for producing artificial stone, cement, &c., have been tried; but, in consequence chiefly of the cost of disintegration, no results were obtained with commercial success. Mr. John Giers, of Middlesborough, about 15 years since, produced a coarse kind of slag-sand, which, after grinding under edge-runners, was used extensively for some little time upon the pig beds; but it had to be abandoned, because it consolidated too much, causing violent explosions (technically termed "boils"), from the steam from the damp sand being unable to escape when the metal was run from the furnace in pigs. Thus, it will be observed that, up to the time when the Cleveland Slag Works was started, there was not a single instance of slag utilization in this country—otherwise than for road making, or for river work—commercially carried on. Before proceeding to describe the various manufactures produced at the Cleveland Slag Works, at Middlesborough, it is necessary to draw your attention to the chemical nature of the material operated upon. The following analysis gives a good general idea of the chief slags produced in the United Kingdom:

	Cleveland.	Hematite Bessemer.	Dowlais.	Dudley.
Lime	32.68	50.55	30.47	35.68
Silica	36.30	30.50	43.07	38.76
Alumina	28.95	15.00	14.85	14.48
Protoxide of iron	0.56	0.41	2.51	1.18
Protoxide of manganese	0.32	0.10	1.37	0.23
Magnesia	5.83	2.00	5.87	6.84
Potash	0.59	0.40	1.84	1.11
Soda	0.37	0.26	—	—
Sulphur	1.73	1.50	0.89	0.98
Phosphoric acid	100.00	100.00	100.00	99.26
Loss oxygen of the lime combined with sulphur.	0.86	0.75	0.44	—
	100.04	99.95	100.45	—

For easy reference the following table of comparative analysis is given:

	Lime	Silica	Alumina	Protoxide of iron	Protoxide of manganese	Magnesia	Potash	Soda	Sulphur	Phosphoric acid	Loss oxygen of the lime combined with sulphur.
Slag	32.68	36.30	28.95	0.56	0.32	5.83	0.59	0.37	1.73	100.00	0.86
Hematite Bessemer	50.55	30.50	15.00	0.41	0.10	2.00	0.40	0.26	1.50	100.00	0.75
Dowlais	30.47	43.07	14.85	2.51	1.37	5.87	1.84	—	0.89	100.00	0.44
Dudley	35.68	38.76	14.48	1.18	0.23	6.84	1.11	—	0.98	99.26	—
Portland Cement	68.80	17.15	7.68	0.31	0.03	0.20	0.11	0.02	0.01	100.00	0.01
Slag Concr. Bricks	90.00	8.00	1.00	0.01	0.01	0.01	0.01	0.01	0.01	100.00	0.01
Slag Cement	90.00	8.00	1.00	0.01	0.01	0.01	0.01	0.01	0.01	100.00	0.01
Gypsum	33.33	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00	0.00
Puzzolanas	8.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00	0.00

It will be noticed that three most important component parts of these slags are silica, alumina and lime, forming, as they do, about 90 per cent. of the whole. The two latter of these, however, chiefly exist as silicates; if, to these caustic lime be added, the silicates are acted upon. Water of combination, or crystallization, is taken up; and, if the material be kept damp

and exposed to the air, hardening or induration is carried on for months. If caustic lime be added to slags poor in lime, so as to bring this element up to 55 or 60 per cent., it will be seen at once how closely it will resemble the analysis of Portland cement, the composition of which is as follows:—Lime 60 per cent.; silica, 24 per cent.; alumina, 8 per cent.; oxide of iron, 4 per cent. German Portland cement is sometimes made with as low as 55 per cent. of lime, while Roman cement has often only 50 per cent. of lime; but these will generally be found to contain oxides of iron in an increased proportion.

The remarkable hardening effect of oxides of iron in conjunction with lime, silica, and alumina, is well known, and is well exemplified in the Italian puzzolanas, where, in several of the best qualities, the lime is actually as low as 8 per cent. while the oxides of iron run up to 12 or 15 per cent. The hardening effect of oxides of iron induced Mr. Wood, prior to the development of the slag industries, to employ the dust from the ironstone clamps in place of sand, when making concrete for heavy foundations; and the setting properties and strength of this combination have upon examination been fully confirmed. Again, having to erect a row of columns for a large roof upon the bed of an old ironstone clamp, the floor of which had been accumulating for several years, it was found to be so extremely hard that the author simply leveled the bed down, and set the columns directly upon it. These, after many years, show not the slightest signs of settlement, although the ground underneath had been made up from ship's ballast. It appears an absolute necessity for obtaining good results, that the ferruginous material should be calcined, or roasted, the effect of which is to drive off the carbonic acid and water; the re-absorption of the water, which unites in chemical combination with the material, afterward assists in hardening. These remarks would seem to be a digression from the question of slag utilization, but, as will be seen hereinafter, they bear directly upon the manufactures carried on at the Cleveland Slag Works.

(To be continued.)

New Application of Celluloid.

A new and ingenious application of celluloid to the formation of clichés for multiplying copies of engravings comes from Paris. The inventor of its application to printing purposes, Mr. Jannin, first covers the wood block or metal plate to be printed with a thin film of moist cement, the composition of which is, in fact, the key to the whole process, for, in addition to its fine surface, it must possess sufficient hardness to resist the great pressure subsequently brought to bear upon it. As soon as it sets and hardens, which it does in a few minutes, it is removed from the block or plate, carrying on its surface an exact impression of the engraving. It is then placed, surface uppermost, on the bed of a hydraulic press, a leaf of celluloid is laid upon it, and pressure is applied. At the same time the temperature of the apparatus is raised to 250° F. to soften the celluloid. At the end of five minutes a stream of cold water is turned upon it for another five minutes, the pressure continuing all the time. The leaf of celluloid is then liberated from the press and the cliché is ready for printing. Rapidity of production is not the only advantage claimed for this invention.

The hardness and elasticity of the material are such that, it is said, a celluloid cast or mold will stand ten times the wear of an electrotype without showing signs of deterioration. Nothing, also, can equal the perfect reproduction of the finest details on the celluloid surface, as no black lead is present to fill up the fine lines of the original, as in the ordinary electrotype process. The invention is also applied as a substitute for common stereotypes, in multiplying copies of ordinary type. The celluloid leaf is so elastic that it can be fixed at once to a cylinder surface, if required, as easily as to a flat surface of the printing press. The quickness of the process seems to be its initial advantage; the hardness and elasticity of the clichés, which greatly diminish the risks of battering, and the extreme delicacy with which the finest lines of an engraving can be reproduced, are auxiliary merits. Impressions from a celluloid plate taken from an etching, and the fidelity of the reproduction, even to the much-admired burr, were marvelously perfect. In the matter of cost, it is said that celluloid plates have no advantage over electrotypes.

American Reaping Machines at Bucharest.—The Bucharest correspondent of the Times says: "At a recent trial of the self-binding reaping machines on the grounds of the Agricultural College here the following four American makers were represented: Walter A. Wood, the Johnson Harvesting Machine Company, McCormick & Co. and Aultman & Co. The Aultman machine won the first prize, McCormick & Co. the second and the machine of Walter A. Wood the third prize. The first prize winner cut and bound five acres of wheat in four and a quarter hours. Mr. Lee, of Bucharest, has taken the agency of the Aultman machine and has given an order for forty of them." The superior quality and extreme lightness of American farming implements have attracted the attention of intelligent farmers, who are beginning to realize that they must introduce American labor-saving implements if they desire to compete in the grain markets of Central and Western Europe.

L'Ancre has had under its notice, during the last two months, a little machine, the patents for which are not yet complete, intended to manufacture wire-rod down to No. 20—three-tenths of an inch in diameter. A flat bar of the necessary dimensions is passed through a pair of little five-grooved rolls, and comes out separated into five rods adhering by means of a slight web, which is nearly all removed on splitting. We may add that a similar plan has been patented recently in Germany by Herr Wilhelm Boecker, of Schalke, Westphalia.

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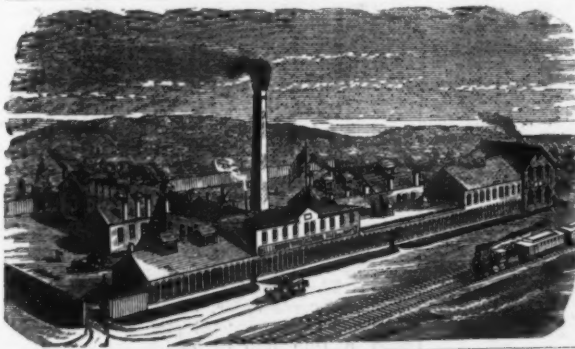
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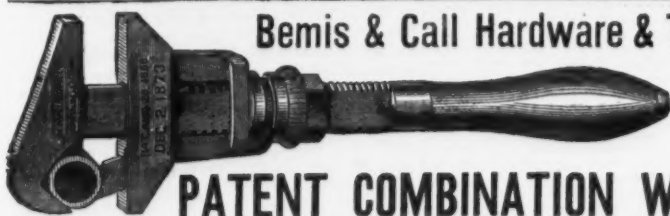
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Handsaw Taper, single cut,
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High Back,
Hook-Tooth,
Knife,
Knife Blunt,
Lead Float,
Lightning,
Machine Mill,
Mill,
Mill Blunt,
Mill Pointing,
Pillar,
Pitsaw,
Reaper,
Roller,
Round,
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Slotting,
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Oval or French Shoe,
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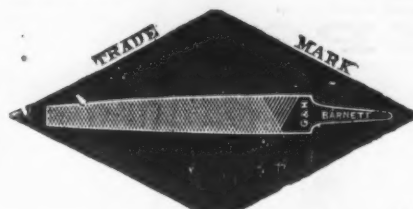
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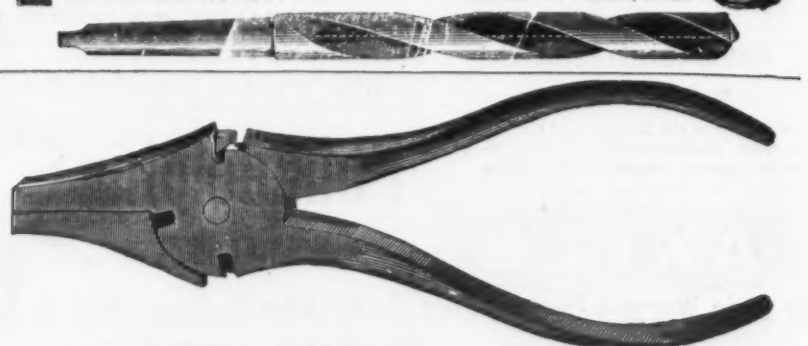
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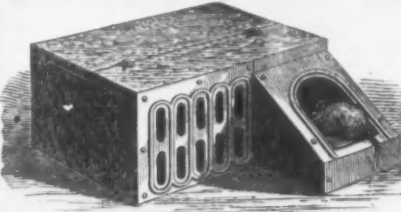
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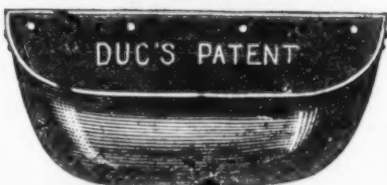
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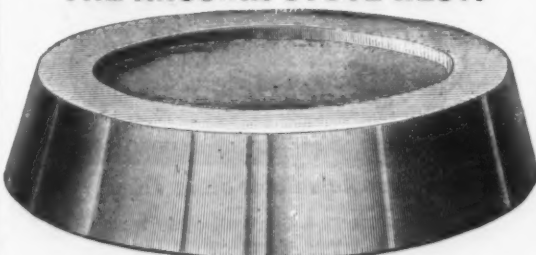
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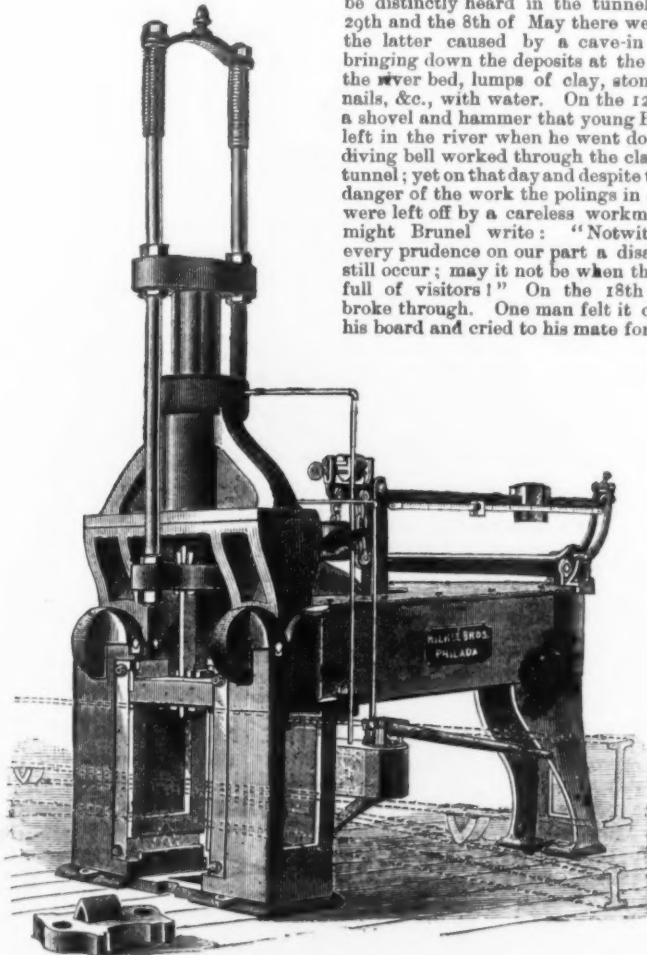
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A Hydraulic Testing Machine.

We illustrate in the accompanying engraving a recent design of a hydraulic testing machine by Messrs. Riehle Bros., of Philadelphia. The main features of this class of machinery are familiar to those of our readers interested in the matter. The present machine is remarkable for compactness and strength. A machine having a capacity of 150,000 pounds and weighing over 5 tons, occupies a space 8 feet long, 5 feet wide and 11 feet high, with extension rods. There are no loose weights, a running poise being used which holds itself in position in the notch when the specimen breaks. The range of size of specimens is considerable, those for tensile strength being limited only by 4 feet length, and by the simple addition of extension pieces at the bottom of one end of the machine, much greater lengths can be tested. The range for compression is from 2 feet down, while articles for transverse stress may be from 3 inches to 4 feet long. By the use of a master beam, considerable lengths of beam or girders may be proved. We may add that Mr. John



THE RIEHLE HYDRAULIC TESTING MACHINE.

Fritz has selected a machine like that shown for use at the works of the Bethlehem Iron Company.

The First Great Subaqueous Tunnel.

The disaster in the Hudson River Tunnel recalls the vicissitudes of the first great subaqueous tunnel under the Thames. Two or three attempts had been made to connect the shores of Essex and Kent by a subaqueous passage, but all had failed, when one day, as Brunel was passing through the dockyard at Chatham, his eye was caught by a piece of ship timber perforated by that most destructive of worms, the *Teredo navalis*. The study of its mode of operation suggested the idea of constructing a vast cast-iron shield, which should bore like an auger by means of strong screws, while as fast as the earth was cut away bricklayers should be at hand to replace it with an arch. Sir Isambard Brunel has described it as "an ambulating coffer dam traveling horizontally." In spite of the failure of Mr. Vase's operations in 1805 and those of Mr. Trevethick in 1807, Mr. Brunel's plans so commended themselves to the Institution of Civil Engineers and the public that, at a meeting held on the 18th of February, 1824, a company was formed and 1381 shares of stock subscribed for. Borings having been begun to test the soil, the first stone of the shaft on the Rotherhithe bank, about 50 yards from the river, was laid March 2, 1825. The shaft, 50 feet in diameter, was of brickwork, bound with iron and wood, 3 feet thick and 42 feet high. It was built on the surface of the ground, and the earth being excavated from within and underneath, it sank gradually to its final position, the space of 20 feet beneath, left for the opening of the tunnel, being constructed by underpinning. August 11 the underpinning was completed, and October 11 the reservoir at the bottom for receiving the permanent pumps was finished. On the 25th of November, 1825, the shield made its first start, it having been determined to construct the tunnel in the form of a rectangular mass of brickwork, 37 1/2 feet wide and 22 feet high, pierced by two parallel horseshoe archways, each 14 feet wide and 17 feet high.

If the non-scientific reader will imagine an edifice of three rows, each of twelve iron boxes 9 feet deep, 6 feet high and 3 feet wide, each box faced with small movable boards and occupied by a workman, he will have an idea of the Brunel shield. It was placed just beyond the completed brick arch. Each man, removing one or two boards, excavated some of the clay. When a sufficient space had been cleared the shield was moved forward and the brick arch behind built up, under a shelter of iron "staves" connecting the "frames" of the shield with the completed brickwork. Work was prosecuted under some difficulty, the water often infiltrating rapidly or breaking in at the boards, while, as the men were hired by the piece,

things were done rather with an eye to haste than to solidity and safety. On May 11, 1826, 100 feet had been completed, and by August 12, 205. On the 10th Brunel records: "Found the lowest cell of No. 1 left by the workmen without a single piling against the ground. This is, indeed, a most unjustifiable neglect." September 8 began an alarming flow of diluted silt lasting for a week, and another occurred in October, showing that the shield was moving close under the water. The engineer, warned by "the men driving on without any consideration or fear of consequences," recorded November 20 that for nine days he had spent more than twenty hours daily in the tunnel. December 20, through the carelessness of a miner, the whole facing of one frame fell, followed by a caving of the earth, but luckily the river did not break in. February 3, 1827, the tunnel having been driven 406 feet, Brunel complains of the "dust under the Thames."

March 29 they were again in the threatening clayey silt; April 20 some bones and china came down; on the 22d young Brunel went down in a diving bell in 30 feet of water above the shield, and the noise of his driving a rod into the bed of the river could be distinctly heard in the tunnel. On the 29th and the 8th of May there were panics, the latter caused by a cave-in of earth, bringing down the deposits at the bottom of the river bed, lumps of clay, stones, bones, nails, &c., with water. On the 12th of May a shovel and hammer that young Brunel had left in the river when he went down in the diving bell worked through the clay into the tunnel; yet on that day and despite the known danger of the work the pilings in one frame were left off by a careless workman. Well might Brunel write: "Notwithstanding every prudence on our part a disaster may still occur; may it not be when the arch is full of visitors!" On the 18th the river broke through. One man felt it coming at his board and cried to his mate for help, but

the latter replied that his "face" was running in too; a sheet of water wrapped both and washed them out of their cells, knocking down those who had gone to their help; the water "came in most magnificently," filling the tunnel and shaft, but not a life was lost. Brunel records that being relieved by the catastrophe of the anxiety in which he had been, he spent "a most comfortable night." On the 20th he adds: "apropos of the inevitable sermon by the curate of Rotherhithe, declaring that the accident was 'a just judgment upon the presumptuous aspirations of mortal men.' 'The poor man!' The ground was promptly reconnoitred from the diving-bell, and the work begun of filling the hole with gravel and clay in bags, rafts and tarpaulins being also sunk. By June 25th the men could re-enter the shield, and did so in order of precedence, the last men out of the works leading the way in. By July 26th they could walk to the frames, and in August the tunnel was pumped dry and work was progressing as usual. December 18th, 1827, found them working in clay fissured by numerous springs. At 6 a. m. on the 12th of January, 1828, the water again broke in. Young Brunel ordered the men to retreat, and was last to leave the frames, when, with a tremendous roar, the flood came through and washed the timber staging down on him and six other men. Though his knee was badly injured, he swam toward the stairs and was washed up the shaft; all his companions were drowned. The injuries he had received kept him under medical treatment for several months, and the work was temporarily abandoned. After 4000 tons of clay in bags had been lowered into the break it was filled, the tunnel was pumped out and the shield bricked in, but then the enterprise came to a standstill for lack of funds. In 1835, on the solicitation of the Duke of Wellington, the government advanced £246,000 to the company and the work was again begun, some improvements being made in the shield. On the 23d of August and the 3d of November, 1837, and on the 21st of March, 1838, there were eruptions of the Thames, one man being drowned in the second of these. In October, 1840, the Wapping shaft was commenced; it was sunk the entire depth of 70 feet without underpinning, and the junction between it and the tunnel was not made without some difficulty. On the 1st of August, 1842, the work was completed, but the tunnel was not formally opened until March 25, 1843. The accounts presented at the first annual meeting showed that 2,038,477 people had passed through it during the year, producing a revenue of £8475. 2/3, besides which a sum of £460 was derived from the rent of stalls. It had cost £468,000, and as the tolls soon sank to about £5000 a year, the income barely sufficed to keep the work in repair. Could it have been completed with carriage ways it might have paid, but the company could not raise the £180,000 necessary for this purpose. In 1865 the tunnel was bought by

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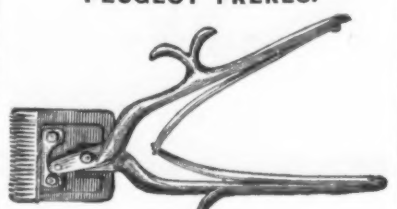
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the East London Railway Company for \$200,000; July 19, 1869, it was closed as a footway, and soon after it began to be employed as a link between the Great Eastern and North London Railways and those on the south of the Thames. In 1869-70 was constructed a new tunnel, the Thames Subway, with a shaft on Tower Hill; another was constructed from Arthur street to St. George's Church, Borough, and another from Poplar to Greenwich. Another tunnel was begun at Woolwich August 23, 1876.

None of our American subaqueous canals have hitherto—so far as we are acquainted—involved in their construction loss of life. Chicago has four of them. Two, of 5 and 7 feet diameter respectively, lined with two rings of brick, run from the shore underneath Lake Michigan to "the Crib," two miles out, and from an iron cylinder sunk within the crib receive the water supply for the city. They cost respectively \$457,844 and \$411,510. There are also two tunnels under the Chicago River for foot passengers and vehicles, one at La Salle street connecting the South and North Divisions, one at Washington street connecting the South and West Divisions. Cleveland, Ohio, has also a tunnel 666 feet in length, driven out under the lake, at a cost of \$320,352, to obtain a water supply. At Detroit—or rather under the Detroit River, between Anderson and Stony Island—there is in process of construction a railroad tunnel 4450 feet long, without speaking of the approaches and bridges. It is to be completed by December 1, 1880, at a cost of \$1,500,000. Preliminary works, it might also be added, are under way at Sanagatta and St. Margaret's Bay on the gigantic Channel tunnel, which will be 22 miles long, without including approaches of 9 miles.

The Mineral Resources of Rhenish Prussia and Westphalia.

The Düsseldorf exhibition has afforded the busiest mining district of Germany an excellent opportunity to show its vast resources, and from all accounts which reach us it appears that they have well used their opportunity. From an official catalogue, prepared for the occasion, we take the following relating to the history and previous development of its coal, metalliferous and iron mines:

The working of coal mines forms the foundation of the prosperity of the Rhenish and Westphalian iron manufactures. Its principal centers are on the rivers Ruhr and Saar, but there are several smaller centers near Aix-la-Chapelle, Ibbenbüren and Minden. The first mention of coal at Essen dates as far back as 1317, and the real "title income of coal" (Kohlen-Zehnt-Einnahmen) is not mentioned until 1530-1539. At Essen, Kellinghausen and the Abbey-Werden, there were, in 1802, about 127 collieries being worked, and 44 idle. The yearly production amounted to 1,644,070 ringel, equal to rather more than 7105 tons. In 1802 they came under the Prussian domain, which adopted in 1803 the Clevisch-Märkisch mining regulations, which remained in force until 1813. The first engine was used in 1804, and the sinking of shafts was then commenced. Beside the coal pits at Essen and Werden there were others at Mühlheim-on-Ruhr, but in 1814 only 64 were in operation. The output at Essen-Werden amounted in 1816 to 668,533 tons, and increased in 1829 to 847,454 tons, 47 pits, with 1018 men, being at that time at work. In 1829 only two mines, with 473 men, were worked, but these gave an output of 247,470 tons. Up to 1830 Holland hemmed in the coal trade, but when after the separation of Belgium the trade was declared free, the exports to Holland rose enormously, and amounted in 1841 to 2,763,660 tons. After the opening of the Köln-Minden and Steele-Vohwinkel railways in 1847 the exports increased still more. In 1848 the lines to Oberhausen and Ruhrort were opened, and connecting lines with the collieries were constructed.

The production of coal at Essen in 1847 was 3,445,870 tons, was stationary in 1848 and 1849, but rose again in 1850 to 3,903,522 tons. The number of pits at work in 1850 was 55, with 5654 men, and the value of the production 1,492,937 thalers. Of the above-mentioned 55 collieries, 29 were deep mines, with 69 engines of 4750 horse-power. Three parts of the production went to Holland. Special attention was paid to these mines on the part of the government. In 1851 the privileges were increased and the taxes decreased, which naturally led to an enormous increase of production and a favorable trade. In 1853, over 5,000,000 tons; in 1854, 7,000,000 tons; and in 1855, 8,500,000 tons were sold. The collieries increased, and different companies were formed, but when, in 1857, the financial crisis became apparent, it was soon shown that the production had outstripped the supply. Notwithstanding this, the production continued to increase, and had reached 10,000,000 tons in 1858. The price of coal, however, decreased, and remained at a low ebb up to the end of 1861. During this crisis, in consequence of the low prices, the sales increased, and more work was done. In 1858 a single man could produce, on an average, 720 tons, and in 1861, 902 6-10 tons. This over-production was noted again during the late crisis which commenced in 1874, and was not overcome until the end of last year, when the revival of trade set in. The development of the collieries at Essen, Werden and Broich went parallel with the adjoining mines at Bochum and Dortmund. Not until 1302 did we hear of coal mines at Dortmund. In 1600 the production of coal appears as the "Regal" of the magistrate, and at that time many miners came over from Liège. To facilitate the transport of coal the Prussian government had the Ruhr made navigable, and in 1772 they opened it for free navigation, which increased trade enormously. The output of coal in the Earldom of Mark amounted in 1787 to 1,769,000 bushels, and rose in 1852 to 19,500,000 bushels.

Nothing is heard of coal mines on the Saar until the fifteenth century, and they only gained notability under Fürst Wilhelm Heinrich, of Nassau-Saarbrück, who not only improved the working of these mines, but also laid the foundation of the present large manufactures by erecting various foundries and factories. After 1836 there were 116 parishes which received 405,750

tons of coal for fuel at very low rates, and it gradually was used more and more for household and manufacturing purposes. The Regents of the neighboring territories, with the exception of the Lothringen, followed the Fürst of Nassau-Saarbrück, and put all their mines under government.

The first private coal-mining concern was established in 1804; several others followed later on, but even up to the present time the leading coal mines are in the hands of the government. In 1750 the output amounted to from 2500 tons to 3700 tons annually; in 1795 it rose to 500,000 tons, and in 1815 it amounted up to 800,000 tons. This slow development lasted until 1850. The output in 1830 was 2,000,000 tons, and in 1850, 600,000 tons. Through the opening of the Saar basin and the railways, trade increased very much, and, instead of the small surface pits, deep shafts were worked with machinery, and thousands of men employed. In 1853 the output reached 11,000,000 tons; in 1860, 2,000,000 tons; in 1865, 3,000,000 tons; in 1875, 5,000,000 tons, of which 4,000,000 tons came from nine large Prussian government works, 1½ million tons from five Prussian private, 5000 tons from three Bavarian government works, and 400,000 tons from two Lothringian private mines. There are two smaller pits in the Inde and Warm district, near Aix. The former, near Eschweiler, was almost exhausted in 1628. The output from both places has for the last 20 years been very much behind that of the Ruhr and Saar district, but that of Ibbenbüren and Minden is still less, the latter having been completely ruined by the competition of the Ruhr coal.

The total coal production of Rhenish Prussia and Westphalia during the last 30 years has been as follows:

Years.	Tons.	No. of Mines.	No. of Men.
1855.....	5,257,870	286	39,973
1860.....	6,251,000	338	46,031
1864.....	10,511,000	279	36,422
1867.....	14,787,000	276	125,442
1872.....	19,695,000	282	166,470
1875.....	22,533,000	300	192,850
1878.....	24,777,000	242	.....

The most important iron mining district, besides the scattered mines on the Hahn and the Ruhr rivers, is the famous Siegen district. From early times the district has been celebrated for its steel stone, as it is called, which, for many years, yielded the principal supplies of spiegeleisen for the steel manufacture of Europe. Until after 1850 the iron industry of Siegen, through want of fuel and cheap transport, remained behind other iron-producing districts. The mining—and only the surface portions of the richest deposits were worked at all—was conducted upon a limited scale, by small guild-like cliques, while the smelting business was in the hands of hundreds of partners, and, as well as the refining process, carried on entirely with charcoal, so that operations were mostly limited to day levels above the neighboring valley. Only in a few pits were deeper levels driven, and even in those they only attempted to keep out the water by such a power as was procurable by manual labor, or by a small water engine. More, however, was but little needed; workings to the deep seams were unnecessary, since the supplies of ore standing above the water level were far greater than the requirements of the trade. Added to this, the more the price of iron in England, Belgium, &c., fell, the more disadvantageous was it to the Siegen production, and the smaller was the sale obtained; hence, for the most part, the Siegen ores remained unutilized. The construction, in 1840, of a high road to the Rhine and to the coal district had such a favorable effect that, up to 1850, the production of the mines and iron-works had fully doubled. In 1861 a line was opened for traffic connecting Siegen with Cologne, with the coal districts of the Ruhr, and with the Upper Rhine, as well as with the rich hematite iron deposits in the province and Nassau. This laid open an extraordinary field for enterprise in the ironstone, mining and smelting business of the Siegen district.

The extent to which the production of Siegen ores thereupon increased will be readily seen from the following figures: In 1840 the production was 20,063 tons; 1845, 28,354 tons; 1850, 44,723 tons; 1865, 211,016 tons. The year 1864 produced 181,883 tons, which was only 2913 tons less than in 1865; yet this difference for one year was greater than the entire production for 1845. In 1865 one-fifth part of the whole population owed its existence and prosperity to the mines.

In 1878 the Arnsberg district turned out 436,808 tons, while the Coblenz district mined 782,979 tons and Wiesbaden district 461,173 tons. In the Dortmund region, which produced in all 418,653 tons, it was chiefly the Osnaabrueck district which was productive.

Among the oldest iron mines are those in the Düsseldorf district, on the lower part of the rivers Lippe and Issel. The surface iron ore is the only kind found there. Lead ores were found in the Metternich district, and lead mines near Langenberg were worked up to 1772. The present iron mines were not commenced until 1847, when the Bergisch-Gruben und Hüttenverein took the matter in hand. The red ironstone mines in the Metternich district were not worked until 1850, and the coal ironstone mines not until 1855. As these ores are, however, of rather a poor quality, the trade in them has not increased during the last 20 years, the very much richer ores of Siegen now taking the lead. There has also been an increase of production from the lead mines near Lintorf in recent years. The oldest iron foundry in the district is that of St. Antonshütte, near Sterkrade, which was built in 1760; this was followed by the Gutehoffnungshütte in 1782, the Minervahütte, near Isselburg, in 1794, and in 1830 by the Friedrich-Wilhelmshütte at Mühlheim, on the Ruhr.

A great deal of iron ore is also found in the district of Aix-la-Chapelle, at Düren and Schleiden. The working of these mines was commenced in the sixteenth century by the Saxons and Hessians who had settled thereabouts. The production of iron at Düren and Gemünd (Schleiden) amounted in 1818 to 29,450 tons. The greater part of the iron works which ex-

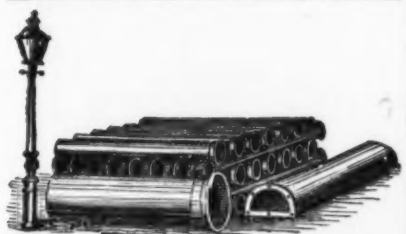


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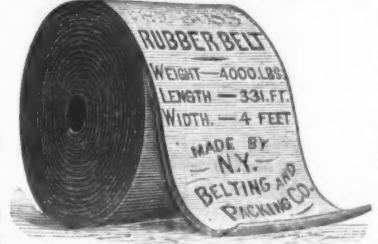
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isted in the Schleiden Valley and Jünkerath
years ago, as the transport of coal to the
Eifel was getting too expensive. Of much
more importance are, however, the zinc
mines at Stolberg and Eupen, as well as
those at Moresnet, at the Altenberg (Vielles
Montagne) and Commern. They were first
worked in 1583, lay idle for some time, but
were commenced again in 1583, and have
been worked ever since with great success.
The mines at Altenberg were already known
in the fifteenth and those at Stolberg in the
sixteenth century. The coal iron ores in the
Trier and Eifel district were ex-
hausted many years since. About the mid-
dle of last century a great many ironworks
and foundries were erected, some of which
belonged to Fürst Wilhelm Heinrich, of
Nassau-Saarbrück, and the blast furnace at
Sulzbach was the first on the Continent (in
1767) where pig iron was produced with
coke. Even during the time of the French
Monarchy the works were of great im-
portance, and had to manufacture war ma-
terials for France. After 1815 business
went slower, but with the opening of the
railroads a new era commenced. All the
old works were rebuilt, and new furnaces
and rolling mills fitted up. The native ores
were left unused and replaced by those from
Luxembourg and Lothringen, which are
softer and better for smelting, and likewise
found in larger quantities. The production
of iron ore showed then an important de-
crease in the Trier district, and the native
ore was, and is now, used, mixed with the
imported article. In the whole district in
1864 there were only 51,100 tons of ore
produced from nineteen mines, with only
204 men, whereas the production in 1840 of
twenty-seven mines, and with 1142 men,
amounted to 105,362 tons. The lead and
copper ores at Bernkastel are worthy of
mention, which, however, together with the
lead mine at Bleialf, were abandoned in the
fifteenth century. In 1840, 86 tons of lead
ore were produced from five mines with 108
men. The iron ore mines in the Coblenz
and Wiesbaden districts have been in op-
eration for many years back, and the mine
near Wetzlar was mentioned in 1219. The
lead and silver mines near Ems are also of a
very old date. Up to the seventeenth cen-
tury the iron was converted from the ore
into forged or hammered iron, and it was
not until later on that pig iron was produced
by means of blast furnaces. Until this cen-
tury the development of the iron manufac-
ture progressed only very slowly, but since
then it has greatly improved. Only a small
part of the ores is smelted in the valley of
the Dill, Lahn and Rhine, the greater part
being taken to the works at Ruhr, Lenne
and Hochdahl. Especially important are
the iron mines at Altenkirchen and Neu-
weid. The ironworks of Rasselstein, near
Neuweid, were the first which, in 1824,
adopted English rolling mills, and were
afterward assisted by the Government.

Tests of Steel Shafting.

Mr. James E. Howard has published, in the
Boston Journal of Commerce, a number of
tests made at the Watertown Arsenal, of
steel shafting made by the Ames Manufac-
turing Company, of Chicopee, and used by J.
W. Cumcock, agent of the Dwight Manufac-
turing Company. The metal was manu-
factured by Messrs. Benjamin Atha & Com-
pany, of Newark, and contained 0.50 per
cent. of carbon. A fact that lends particular
interest to the tests is the size of the spec-
imens. The series of 14 bars were pre-
pared for testing, in sizes running from 1.4
to 2.8 inches in diameter, and from 9.7 to
14 inches in length for the part tested, the
central reduced section. The ends of the
bars were secured in the friction clamps of
the testing machine. Strains were gradually
applied, the effect of each successive load
being observed. Measurements were taken
between the necks of the bars with vernier
calipers and elongations taken to a tooth of
an inch.

TABULATED STATEMENT OF TENSILE TESTS OF SI-
MENS-MARTIN STEEL SHAFTING, USED BY MR. J. W.
CUMCOCK, AGENT DWIGHT MANUFACTURING COM-
PANY, CHICPEE MASS.

Number of specimens.	Length, Inches.	Diameter, Inches.	Sec'l area, Sq. inches.	Elastic limit, Lbs. per square inch.	Permanent set, Under loads of 100,000 lbs. per square inch.	Ultimate tensile strength, Lbs. per sq. inch.	Total elongation of the fracture, Per cent.	Contraction of area at fracture, Per cent.	Remarks.
1	9.748	1.408	1.543	40,000	.003	50,000	14.0	31.9	Fine grain, frac.
2	9.748	1.408	1.543	40,000	.003	50,000	14.0	31.9	Fine grain, frac.
3	9.748	1.408	1.543	40,000	.003	50,000	14.0	31.9	Fine grain, frac.
4	9.748	1.408	1.543	40,000	.003	50,000	14.0	31.9	Fine grain, frac.
5	9.748	1.408	1.543	40,000	.003	50,000	14.0	31.9	Fine grain, frac.
6	9.748	1.408	1.543	40,000	.003	50,000	14.0	31.9	Fine grain, frac.
7	9.748	1.408	1.543	40,000	.003	50,000	14.0	31.9	Fine grain, frac.
8	9.748	1.408	1.543	40,000	.003	50,000	14.0	31.9	Fine grain, frac.
9	9.748	1.408	1.543	40,000	.003	50,000	14.0	31.9	Fine grain, frac.
10	9.748	1.408	1.543	40,000	.003	50,000	14.0	31.9	Fine grain, frac.
11	9.748	1.408	1.543	40,000	.003	50,000	14.0	31.9	Fine grain, frac.
12	9.748	1.408	1.543	40,000	.003	50,000	14.0	31.9	Fine grain, frac.
13	9.748	1.408	1.543	40,000	.003	50,000	14.0	31.9	Fine grain, frac.
14	9.748	1.408	1.543	40,000	.003	50,000	14.0	31.9	Fine grain, frac.

Mr. Howard, referring to these figures,
says: An inspection of the above table
shows the average elastic limit to be 49,000
per square inch. This practically is the
limit of usefulness of the metal. Any load
applied beyond this distorts the metal, and
when the load is released the shafting does
not return to its original form. Greater
rigidity in determining the elastic limit of
these specimens was exercised than is the
custom of some experiments. I have placed
the elastic limit at that point where the first
permanent set or elongation was produced
in the bar, recognizing the first thousandth
of an inch. It was observed that the speci-

mens took only a slight set at the elastic
limit, which was not increased in amount
till a much higher strain had been applied.

For example: Bar No. 11 took a perma-
nent set of 0.002-inch, with a strain of 46,000
per square inch, which was not increased
till 52,000 per square inch was reached, when
the set measured 0.003-inch, and this set re-
mained the same till 58,000 per square inch
was reached, when the bar elongated rap-
idly. Using the definition for the expres-
sion elastic limit adopted by many as that
point where the elongations cease to be pro-
portional to the applied loads, and we should
have a much higher limit of elasticity in the
above specimens than I have credited the
metal, and to compare the above metal with
superior wrought iron, a test bar was pre-
pared. The specimen was turned down from a
2 1/4-inch round bar. Its dimensions and
the results of the test are as follows:

Inches.	Length of part tested.	Diameter.	Sectional area, per sq. in.	Elastic limit, lbs. per sq. in.	Permanent set after load—25,000 lbs. per sq. inch.	Permanent set after load—30,000 lbs. per sq. inch.	Ultimate tensile strength, lbs. per sq. in.	Total elongation after fracture, per cent.	Contraction of area, per cent.	Appearance of fracture, fibrous.
9.664	1.654	2.149	25,000	.006	.046	.091	49,150	28.9	33.4	

A comparison of the test of this one bar of
wrought iron with the average of the 14 steel
bars shows the elastic limit of the steel to be
95 per cent. above the iron, or nearly coinci-
dent with the ultimate strength of the iron.
In other words, it is safe to load the steel re-
peatedly and without producing injury with
a load that will destroy a bar of the best
iron. The ratio of strength between the
tensile and torsional resistance of iron and
steel is not accurately known. Obtaining
the best authority upon this subject from
Prof. J. E. Denton, of the Stevens Institute
of Technology, it would appear that the tor-
sional strength of the steel bore about the
same ratio to the iron that its tensile
strength did.

The Molly Maguires Again.—A com-
munication from Tamaqua, Pa., under date
of the 22d inst., describes the murder of
engineer James Woods, at Bull Run, by
Molly Maguires, as follows: "Woods had
been to Summit Hill to attend a funeral, and
was returning home at sundown by way of
the old road by Foster Tunnel when masked
men met him and committed the deed.
Above Bull Run village, about 100 yards, is
a ledge of rock running even with the road,
and here, under the shadow of some stunted
trees, the Mollys struck their victim. The
remains were horribly scattered about.
Great clots of blood fully seven yards off
from where Woods lay show how he strug-
gled. His forehead was broken in by some
blunt instrument. The rest of the body was
terribly cut and bruised. It lay over a
ledge of rocks, as if placed there. Woods
was an engineer, and ran a stationary en-
gine for the Lehigh Coal and Navigation
Company. He was generally steady and
quiet. Revenge is supposed to have been
the motive for the deed. He had money
with him, as some was found near by. He
was 60 years old. It seems as if we are to
have a reign of Mollism over again. The
past few days their disorders and acts of
violence in Coaldale have been simply
frightful. Shank Gallagher, a notorious
character, returned recently from his re-
treat, and the Maguires are as deep in their
orgies as ever. Bull Run and Gearytown
are small villages in Panther Creek Valley,
just over from here, and, with Coaldale,
Lansford and Summit Hill, were great Molly
places. Our people are greatly excited, and
talk of a vigilance committee once more."

Reduction of French Customs Fees.

The Consul of the United States at Havre,
France, has transmitted to the Department
of State the following decision by the French
Court of Appeal, Civil Chamber, with refer-
ence to the entrance of foreign vessels into
French ports and brokerage fees. It would
appear from the Consul's dispatch that under
this ruling ships can be entered by consign-
ers without the employment of brokers, and
our shippers be thus relieved of onerous
brokers' fees, which amount to 10 cents per
ton on French tonnage, reaching in many
instances as high as \$250. The decision is
to the following effect: "The sole consignee
of a cargo of a vessel may perform all opera-
tions pertaining to the entry through the
customs both of the ship and cargo. The
stipulation of a remuneration in favor of
the sole consignee cannot take away from
him this power, inasmuch as in the decision
attached he is declared to have acted in his
quality and *proprio jure*. In the case of the
clearance of a vessel in ballast without pas-
sengers, the broker has no cause of complaint
of not having been required, because the
tariffs allow him no remuneration for that
service, and that consequently no prejudice
has been caused him."

From a statement prepared at the Treas-
ury Department, it appears that the public
debt, less cash in the Treasury, on August
31, 1865, was \$2,756,431,571.43. Since that
time the decrease has been as follows, the
first item for a period of 10 months only:

Year ending June 30, 1866	\$120,395,407.55
Year ending June 30, 1867	127,804,925.15
Year ending June 30, 1868	27,297,798.46
Year ending June 30, 1869	46,081,549.14
Year ending June 30, 1870	101,601,916.88
Year ending June 30, 1871	84,775,887.54
Year ending June 30, 1872	97,213,536.12
Year ending June 30, 1873	44,118,469.69
Year ending June 30, 1874	1,112,907.06
Year ending June 30, 1875	44,107,984.95
Year ending June 30, 1876	29,115,829.68
Total decrease from August 31, 1865, to July 1, 1876	\$695,506,230.98

From June 30, 1868, to March 1, 1869,
there was an increase of \$10,546,491.15, and
from March 1, 1869, to July 1, 1869, there
was a decrease of \$58,628,031.29, making
the actual decrease for the year \$48,081,-
540.14. The decrease from July 1, 1870, to
January 1, 1878, was \$52,400,182.94. From
January 1, 1878, to January 1, 1879, \$14,-
718,839.38. From January 1, 1879, to Jan-
uary 1, 1880, \$6,699,767.01. From January
1, 1880, to July 1, 1880, \$67,779,803.37, mak-
ing the total reduction of the debt, from
August 31, 1865, to July 1, 1880, \$837,104,-
823.68.

The Iron Age

AND
Metallurgical Review.

New York, Thursday, July 29, 1880.

DAVID WILLIAMS - - - Publisher and Proprietor.
JAMES C. BAYLES - - - Editor.
JOHN S. KING - - - Business Manager.

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CONTENTS.

First Page.—The Volga Bridge. Scientific and Technical. A Gas Explosion in London. Early History of Cut Nails. Production of Iron and Steel Works of Prussia and Saxony in 1878. A New Ocean Steamer.

Third Page.—The Utilization and Properties of Slag.

Fifth Page.—The Utilization and Properties of Slag (Continued).

Seventh Page.—The Utilization and Properties of Slag (Continued). New Application of Celluloid. American Reaping Machines at Bucharest.

Ninth Page.—A Hydraulic Testing Machine. The First Great Subaqueous Tunnel.

Eleventh Page.—The Mineral Resources of Rhendish Prussia, and Westphalia.

Thirteenth Page.—Tests of Steel Shafting. The Molly Maguires Again. Reduction of French Customs.

Fifteenth Page.—Producers and Consumers. Mr. A. L. Holley's Health. The Hudson River Tunnel Disaster.

Seventeenth Page.—The Action of the Stove Association. The Glass Blowers and Belgian Workmen. The American Institute of Mining Engineers. The Seawanhaka Disaster. Foreign Trade Statistics. Why the Tay Bridge Fell. Metallurgical Notes. French Railways.

Nineteenth Page.—Trade Report. General Hardware. British Iron Market. Iron. Metals. Exports.

Twenty-first Page.—Imports. Coal. Old Metals. Paper Stock, &c. Philadelphia. Pittsburgh. Chattanooga. Boston.

Twenty-third Page.—Cincinnati. Louisville. St. Louis. Richmond. Our English Letter. Foreign.

Twenty-fifth Page.—Foreign (Continued). A Challenge to the Steamer Anthracite. Industrial Items. Production of Coal in England and the Loss of Life in Mining. French Trade Statistics.

Twenty-seventh Page.—National Association of Store Manufacturers. Labor and Wages. Another Boiler Heated From. The Luminous Paint in Japan. Government Test Requirements for Boiler Iron.

Twenty-ninth Page.—The Iron Age Directory.

Thirty-first Page.—The Antiquity of the Spoon.

Thirty-third Page.—New York Wholesale Prices.

Thirty-fifth Page.—New York Wholesale Prices (Continued).

Thirty-seventh Page.—New York Wholesale Prices (Continued).

Thirty-ninth Page.—Philadelphia and Pittsburgh Hardware and Metal Prices.

Forty-first Page.—Boston Hardware and Metal Prices.

Forty-third Page.—Boston Hardware and Metal Prices.

Forty-fifth Page.—Boston Hardware and Metal Prices.

Forty-seventh Page.—Boston Hardware and Metal Prices.

Fifty Page.—Boston Hardware and Metal Prices.

Fifty-second Page.—Boston Hardware and Metal Prices.

Fifty-fourth Page.—Boston Hardware and Metal Prices.

Fifty-sixth Page.—Boston Hardware and Metal Prices.

Fifty-eighth Page.—Boston Hardware and Metal Prices.

Sixty Page.—Boston Hardware and Metal Prices.

Sixty-second Page.—Boston Hardware and Metal Prices.

Sixty-fourth Page.—Boston Hardware and Metal Prices.

Sixty-sixth Page.—Boston Hardware and Metal Prices.

Sixty-eighth Page.—Boston Hardware and Metal Prices.

Seventy Page.—Boston Hardware and Metal Prices.

Seventy-second Page.—Boston Hardware and Metal Prices.

Seventy-fourth Page.—Boston Hardware and Metal Prices.

Seventy-sixth Page.—Boston Hardware and Metal Prices.

Seventy-eighth Page.—Boston Hardware and Metal Prices.

Eighty Page.—Boston Hardware and Metal Prices.

Eighty-second Page.—Boston Hardware and Metal Prices.

Eighty-fourth Page.—Boston Hardware and Metal Prices.

Eighty-sixth Page.—Boston Hardware and Metal Prices.

Eighty-eighth Page.—Boston Hardware and Metal Prices.

Ninety Page.—Boston Hardware and Metal Prices.

Ninety-second Page.—Boston Hardware and Metal Prices.

Ninety-fourth Page.—Boston Hardware and Metal Prices.

Ninety-sixth Page.—Boston Hardware and Metal Prices.

Ninety-eighth Page.—Boston Hardware and Metal Prices.

Hundred Page.—Boston Hardware and Metal Prices.

Hundred-second Page.—Boston Hardware and Metal Prices.

Hundred-fourth Page.—Boston Hardware and Metal Prices.

Hundred-sixth Page.—Boston Hardware and Metal Prices.

Hundred-eighth Page.—Boston Hardware and Metal Prices.

Hundred-tenth Page.—Boston Hardware and Metal Prices.

Producers and Consumers.

No doubt there are a great many Englishmen who are so unreasonable as to believe that the work of the Cobden Club propaganda is accomplishing great results, and that the time is not far distant when governments which now protect their own industries will be compelled by the demands of "plundered consumers" to open their ports to free trade with all comers. People of all classes are very apt to believe that their own convictions must ultimately prevail; and when their convictions and their interests happen to agree, this belief becomes so strong as not to seem to admit of the slightest doubt. But there is another and much more intelligent class of English free traders who see that such hopes are delusive, and who are fast reaching the conclusion that free-trade doctrines have no more chance of finding universal, or even general, acceptance under existing conditions than have the doctrines promulgated in Mahomet's Koran. They see that there is no longer a possibility of such a free-trade Utopia as was deemed possible twenty-five years ago; and the more candid among them are admitting that while England is not in a position to profit by any important changes in her customs laws, it is different with other countries, especially those which are attaining through protection an industrial prominence which would be impossible in the face of unrestricted English competition. The London *Saturday Review*, whose loyalty to free trade is certainly not open to question, prints in a recent issue an article full of significant admissions, from which we quote as follows:

In such a world as free traders once dreamed of, a treaty of commerce would be an absurdity. Long before this it used to be supposed every civilized country would have welcomed the produce of every other, and have regarded customs duties as an unpleasant tribute to the coarse necessities of revenue. Unfortunately, civilized governments other than our own have said the very opposite to all this. The only kind of free trade they get any value on is a strictly one-sided kind. They want to get their own goods admitted on easy terms into England. From first to last it is only the producer that they think of. In his interest they are willing to sacrifice their own consumers or to benefit English consumers. They regard the community solely in its producing capacity, without in the least recognizing the fact that each producer is himself a consumer of more things than he produces. A treaty of commerce is an attempt to turn this curious tendency to good account. This generation of Englishmen has pretty well abandoned the hope of seeing free trade become general, and it finds in such negotiations as those which the English Foreign Office is now carrying on with France the best available substitute. The French government will not hear of letting in English goods duty free, but they are willing to make a bargain with us. It is useless to talk to them of the French consumer, or to dwell on the yearning he may be supposed to feel for English manufactures. That is a yearning which the French government recognizes only to check. But they will listen if you talk to them about the French producer and point out to them that, if they will only let this or that description of English goods come into France at a reduced duty, this or that description of French goods shall be allowed to come into England at a reduced duty. It is a come down, no doubt, for free traders to have to use this language; but in their present low state there is no other that they can use. Foreign countries do not, unfortunately, grow wiser by experience. The more they tax imports the more they seem to like the process. One interest after another gets protected, and when all at last on the same footing, those which were first protected want to be put on the same advantage-ground which they first occupied. Left to themselves, therefore, foreign governments are only likely to alter their tariffs in the wrong direction, until at length English manufacturers will have no markets but their own to sell in. In circumstances like these a free-trade government cannot any longer stand on its own dignity. It must take the world as it finds it, and recognize what a terribly protectionist world it is.

The only statement in the above quotation that calls for discussion is that which deals with the relations of producers and consumers. The *Saturday Review* says: "From first to last it is only the producer 'they think of.' * * * They regard the 'community solely in its producing capacity,' without in the least recognizing the fact 'that each producer is in himself a consumer of more things than he produces.' This is arrant nonsense, even from a free-trade standpoint, and we confess our surprise at seeing it in a journal which ordinarily reasons so closely as the *Saturday Review*."

It would not correctly define the difference between the two schools of political economy to say that protection considers the interest of the producer, while free trade considers the interest of the consumer; but were it true of protection that it made the interest of the producer more than temporarily paramount, it would have ample justification in the fact that every individual in the community who is of any value to society has larger interests as a producer than as a consumer. It is not true that "each producer is himself a 'consumer of more things than he produces';" nor is it true if his family and dependents are included. If by "more" is meant a greater variety, it is true enough; but if we take it in the sense in which the word "more" is used by the *Saturday Review*, that is, as meaning a greater amount, it is not true, and cannot be. Under such circumstances a nation would tend steadily, rapidly and inevitably toward starvation and bankruptcy, as some have done, and others are doing, in consequence of having maintained free-trade relations with England. In this country production exceeds consumption by the amount of our annual accumulations of wealth, and by the extent of our surplus of merchandise exports over imports. Every house built, everything made and kept for use, every acre cleared and brought under

cultivation, every dollar saved for investment, represents something that labor has produced in excess of current consumption. It is an economic axiom that the end and aim of human effort is abundance; but how shall abundance be reached, or even approximated, if there is no surplus of production over consumption from year to year?

To consider first the interests of the producer is the duty of a government in shaping its financial policy, for the reason that the producing class is the only one which, in economic legislation, should be considered. The classes which do not produce more than they consume are the paupers, and the improvident who are likely to become paupers. The small class living on incomes derived from investments may seem to be non-producers; but they are supported by the accumulations of somebody's labor, and the fact that their investments yield profit shows that their capital is at work producing increase. When it ceases to produce they have no incomes to live on.

It may be said that these are generalities, and that with a few exceptions the interests of consumers are larger and more important than those of producers, because the former are more numerous. This is only stating the error in another way. Production necessarily precedes consumption, for the reason that nothing can be consumed until it is produced. Production is anything in the way of a service which increases value. The man who passes buckets at a fire contributes as much to the saving of property as the man at one end of the line who fills the buckets or the man at the other end who empties them. So it is throughout the whole range of the productive and distributive industries. The miner who digs ore, the teamster who hauls it, the railroad servant who helps to transport it, are just as much producers as the furnace manager who reduces it to pig iron; and the same is true of all who contribute in any way to the conversion of ore into iron, or who handle this iron in a necessary way until it reaches its ultimate use, as the bridge bolt, the driven nail, or whatever shape it finally assumes. Consumption goes on as steadily and as generally as production, and many consume who produce nothing; yet consumption does not overtake production. If it did there would be no accumulation, no addition to the national wealth from month to month. The end and aim of human effort would not then be abundance, but bare subsistence, and one season of bad crops or an interruption of industry from any cause, would find us in the position which Ireland was in last year. To the fact that we were able to produce more than we consumed, the starving Irish peasantry owe our ability to help them with timely gifts of food and money.

The attempt of the free trade theorist to divide the community into two classes, and maintain the position that the consumers are the more important of the two, is either unintelligent or dishonest. We are inclined to think it dishonest, as those who lay most stress on this distinction probably know that it is not one which will stand the test of critical examination. If production is fostered and encouraged, consumption is the more abundantly supplied; if production is checked, consumption will go on as long as it can, reducing the accumulations of previous production; but when these accumulations are exhausted, what remains but starvation and misery! These are not generalities; they are hard facts. Grant that protection favors the producer; by so doing it favors production, and enables us to produce in excess of our immediate requirements. The man who enjoys protection as a producer needs no more food, and no warmer or more abundant clothing, and no more comfortable house than one who has no protection. But his labor becomes more productive, and he can supply all his reasonable wants and desires and have something left to save against future needs. Sacrifice his interests as a producer and his labor has lost a part, and perhaps all, of its purchasing power. That is about all there is of the protectionist argument, but its truth has been established by the experience of years. The protected producer fares better as a consumer than he could or would if only his interests as a consumer were considered. It is this which brings to our shores annually the thousands of British immigrants who "come to stay," and who could not be induced to exchange their new conditions for those which they gladly left when they came here, however great the sentiment of affection they may feel for the land of their birth. From the fact that here their interests as producers are protected and fostered they accumulate wealth faster, live better in every way, and enjoy larger advantages than free trade could offer them. For the gentlemen who live upon the incomes of their patrimony invested in three-per-cents, free trade is very pleasant. They come as near to being non-producers as any class, except the paupers who are too old to work, and the tramps who are too lazy. But it is possible for people living on taxes collected by the government to take their incomes with them, and there is nothing to hinder them going where they can live cheapest. The great mass of the people, however, are not so fortunate, and luckily the great bulk of the nation's capital is not invested in government bonds, but in railroads, factories, mines, furnaces, improvements, and the countless agencies which contribute to production, or else is represented by tools, skill and habits of useful industry. For these large classes protection is a benefit in every way, and it is not to be wondered at that a policy

which takes care of the producer is popular with the masses.

But there is another side to this subject. The end and aim of protection is to cheapen commodities by encouraging production. Under a protective tariff the competition of domestic producers becomes much sharper and closer than the competition of foreign producers in free markets; and it is a fact which has been so often proven that protection cheapens prices, that we do not need to go over the subject again. To claim that protection ignores the consumer or sacrifices his interests, is to claim what is not true; but even if it were true, protection would still be as logical and reasonable in theory as it is beneficial in its practical operation. Like all other social experiments, its success depends in great degree upon favorable conditions. England, with her manufacturing industries already developed beyond the requirements of her markets, and with so little land available for cultivation that agriculture cannot be profitably fostered, is not in a position to profit by protection. This country occupies a different position in every respect, and with us protection needs no other vindication than its results.

Mr. A. L. Holley's Health.

A rumor has obtained currency that Mr. A. L. Holley is very ill in London. We are able to state, on the excellent authority of a cable dispatch from Mr. Holley, received on the 27th, that this rumor is happily unfounded, and that Mr. Holley is somewhat slowly, but surely, recovering from an attack of jaundice. This news will bring pleasure to many who have heard with concern the rumor of Mr. Holley's severe illness. Few men have a larger circle of friends, and none can claim friends more devoted than Mr. Holley. His delightful personal and social qualities, even more than his high professional position, make him conspicuous in the circles in which he moves. His professional place might be filled, but no one could fill the place which "Holley" holds in the hearts of his friends.

The Railroads of the United States in 1879.

Messrs. H. V. & H. W. Poor have again published their valuable "Manual of the Railroads of the United States," from the introductory chapter of which we gather some interesting data relating to cost, earnings, and other matters.

The report contains the operations of 84,232 miles out of a total of 86,497 miles. In 1878 the number of miles in operation was 81,776, the increase of mileage for 1879 being, therefore, 4721. The gross earnings of all the roads whose operations have been reported equaled \$520,012,999, against \$490,103,351 for 1878, \$472,909,272 for 1877, \$497,257,959 for 1876, and \$503,065,505 for 1875. A marked feature in connection with the increase of earnings is the steady reduction in freight charges which has been going on for several years on all the leading railroads. To continue these reductions an extraordinary increase of tonnage is necessary. The year of greatest prosperity to railroads, prior to 1879, was 1873. In that year the 13 leading railroads carried 45,557,002 tons of freight, receiving therefore \$112,004,648, being an average rate per ton per mile of 1.77 cents. Last year 67,092,549 tons were moved, the receipts being \$116,311,452, or an average of 1.02 cents, per ton per mile. The increase of 1879 over 1873, these figures show, was 47.27 per cent. in the number of tons of freight transported, while the increase in earnings from that source was only 3.84 per cent. The increase in the miles of road operated during that time was 20.83 per cent. The percentage of decrease in freight rates has been 42.31 per cent., which is almost equal to the increase in the number of tons of freight carried. The rate per mile at which the railroads now carry freight would have been considered impossible five years ago. The reduction in freight rates for 1879 was greater than in any previous single year, except among a few of the trunk lines during the memorable "war of rates" in 1875-6. In 1878 the average rate per ton per mile was 1.15 cents, as against 1.02 cents last year, showing a reduction of 0.13 cents for the year. Had the rates of 1873 been maintained in 1879, the freight earnings for the latter year of the various roads in the United States would have reached the large sum of \$222,475,352.

As compared with the preceding year, both the funded and floating debts of the various roads were largely reduced during 1879. The decrease in funded debts amounted to \$15,251,851, while the floating debts were lessened by \$25,367,504, and the capital stocks were increased in an amount aggregating \$187,708,068. Notwithstanding the debt reductions, the amount of interest paid shows an increase of \$9,077,006 over 1878. The average rate of interest paid on the funded debt was 4.91 per cent., an increase of 0.27 per cent. as compared with 1878. The rate of dividend paid averaged 2.49 per cent., a gain of 0.15 per cent. over 1878, when the rate was 2.34 per cent. The increase in amount paid as dividends was \$8,052,102. Thus, while the gross earnings, as compared with 1878, increased \$38,909,648, and the net earnings increased \$32,341,557, the amount paid for interest and dividends only increased \$17,129,106. The remainder has gone into permanent improvements, reserve funds, and other forms of security.

The following table gives the general result of railroad operations for the last nine years:

Year.	Miles operated.	Capital and funded debt.	Gross earnings.
1879.....	84,232	\$4,762,506,010	\$520,012,999
1878.....	78,960	4,589,048,793	490,103,351
1877.....	74,112	4,586,597,248	472,909,272
1876.....	73,508	4,468,391,915	497,257,959
1875.....	71,759	4,415,631,630	503,065,505
1874.....	69,273	4,221,763,594	500,466,016
1873.....	66,237	3,754,543,034	574,419,935
1872.....	57,383	3,159,423,057	495,941,055
1871.....	44,614	2,664,627,645	493,329,208

Classifying the States by their geographical position, the gross earnings for the New England States were \$41,329,825, against \$41,260,203 for 1878, and \$44,590,465 for 1877. Of these earnings, \$23,807,143 were received for transportation of freight, mails, &c., and \$17,522,682 for the transportation of passengers. The net earnings were \$15,586,091, against \$13,685,927 for 1878, and \$13,735,746 for 1877. The dividends paid amounted to \$7,236,205, against \$7,566,655 for 1878, and \$6,977,726 for 1877. The gross earnings of the railroads in the Middle States were \$170,310,846, against \$155,458,968 for 1878 and \$155,943,121 for 1877. Of gross earnings, \$127,115,208 were received for transportation of freight, mails, &c., and \$43,195,638 for transportation of passengers. The net earnings were \$70,416,970, against \$61,559,993 for 1878 and \$61,033,089 for 1877. The dividends paid amounted to \$24,335,164, against \$21,148,442 for 1878 and \$24,390,480 for 1877.

The gross earnings of the railroads in the Southern States were \$43,917,284, against \$42,797,284 for 1878 and \$39,812,358 for 1877. The net earnings were \$14,673,357, against \$14,379,958 for 1878 and \$12,664,346 for 1877. The dividends paid amounted to \$2,131,770, against \$2,805,799 for 1878 and \$2,740,793 for 1877. The earnings from freight, mails, &c., were \$32,595,806, and from passengers, \$11,321,478.

The gross earnings of the railroads of the Western States were \$232,379,646, against \$200,852,275 for 1878 and \$193,204,516 for 1877. The net earnings were \$98,961,906, against \$77,958,229 for 1878 and \$66,085,243 for 1877. The dividends paid amounted to \$23,501,262, against \$19,341,222 for 1878 and \$14,556,462 for 1877. The earnings from freight, mails, &c., were \$77,930,875, and from passengers, \$54,448,771.

The gross earnings of the railroads in the Pacific States were \$10,721,157, against \$10,082,491 for 1878 and 7,766,922 for 1877. The net earnings were \$6,606,390, against \$3,501,625 for 1878 and \$2,655,137 for 1877. Included in net earnings is the rental paid by the Central Pacific Railroad Company for the use of the Southern Pacific Railroad. The dividends paid were \$584,104, against \$930,000 for 1878 and \$240,099 for 1877.

On the Pacific Railroads the earnings aggregated \$30,354,241, against \$30,652,130 for 1878 and \$32,170,082 for 1877; of this sum, \$8,127,165 was derived from passengers, and \$22,227,076 from transportation of freight, mails, &c. The net earnings were \$13,672,010, against \$16,489,425 for 1878 and \$15,053,582 for 1877, and the dividends \$3,832,965, against \$1,837,250 for 1878 and \$7,281,640 for 1877. Taken as a whole this is a very satisfactory showing as regards our railroad system, and one which indicates a state of general prosperity.

The Hudson River Tunnel Disaster.

During the week which has passed since the collapse of the Hudson River Tunnel, some data have been gathered which tend to throw light upon the subject. Until the large connecting chamber, the scene of the disaster, is reached, no authoritative statement concerning the causes of the accident and no apportionment of the blame can be made. One thing ought, however, to have become sufficiently apparent to the public at large. That part of the undertaking which was approaching a successful completion was one of exceptional difficulty. The circumstances to be encountered were peculiar, and there is no probability that similar work will be necessary during the construction of this tunnel. The problem was to replace a temporary approach, of small size and inconvenient location, by a permanent structure of very large dimensions. We are unable to say exactly why the preliminary entrance was planned and constructed in such a peculiar manner. The engineers had to deal with the facts before them, however, and had to take down the entrance rings and put up in their stead a series of iron rings, in segments, large enough to form the connection of the two tunnels already built and the large single tunnel which was to form the approach. The dimensions of this connecting chamber, as we may call it, are, of course, large, and its form naturally an awkward one. This was aggravated by the fact that connection had to be made with the rough outer masonry of the circular shaft. To this must be added that the ground is particularly unfavorable. A glance at the section of the Hudson River Tunnel, given in *The Iron Age* of May 20, will suffice to clearly set forth this point. Within a foot, or even less, of the bottom a layer of sand is reached, which was known to carry water under some pressure. Above the tunnel were a few feet of silt, while the rest of the ground to the surface was loose filling, easily passing water. It was well known

also that special means had to be adopted to prevent the compressed air from blowing through. Such were, briefly, the circumstances under which the work of completing the base for all future operations had to be done. We are in a position to state that those conducting the enterprise were alive to the difficulties of this work, and entered upon it only after full and due preparation. We are not inclined, therefore, to join in the senseless clamor of those who condemn in a sweeping manner the work and its managers. It is an easy matter after the collapse of state, with much confidence, that it was reckless and criminal negligence to use a new and untried method. Engineers have rushed into print averring that the Haskin system of tunneling was a failure, as they had predicted it would be on sundry occasions. Such utterances are unfair, unjust and unprofessional, and in this case evidently proceed from ignorance of the facts. Events have shown that dependence upon compressed air in the connecting chamber was not a safe method. Those conducting the enterprise deserve censure in any case, even if it should be proven that the workmen were at fault by allowing a leak of air which they might have prevented from growing unmanageable. The engineers, superintendents and foremen were responsible for any lack of vigilance, especially as they were in a position to rate the danger correctly. But to conclude from the disaster that the Haskin system is a failure, is utterly unwarranted by facts. In the connecting chamber the air was given an opportunity to escape, and the water, which it was its only function to keep back, rushed in, occasioning, at the same time, violent movements of the ground. As both the doors of the air-lock were left open, still greater facilities for escape were afforded to the air confined in the tunnel.

In running the ordinary tunnel through the silt of the Hudson River the case is quite different. Air at 20, or even at 40, pounds pressure per square inch does not readily make its way through 20 feet of argillaceous material which, after the water is forced out of it, will stand in straight benches. Even if the ground should become somewhat fluid, there are excellent means of protection at the disposal of the engineer. The results of the operation of running 350 feet of tunnel have sufficiently proven that, in the case of the passage under the Hudson River, the system is an excellent one. How it would do in quicksand and under conditions where higher pressures and a less tenacious material is to be dealt with, we have no means of predicting as yet.

How long the work on this grand enterprise will be delayed by the accident it is difficult to say. At present a coffer-dam is in course of construction. One of the doors of the air-lock has been closed and the water pumped out which had entered the shaft. The water rose and fell with the tide, showing that it communicated with the river. The condition of the wreck must of course largely guide future operations. It is very likely that the completed part of the structure, 300 feet in one tunnel and 50 feet in the second parallel one, is intact, as its shell of iron and two-foot lining of masonry have probably protected it from serious injury. Work will be continued on the plan followed hitherto, and with rapid work in following the excavation by masonry, and possibly by driving a small advance heading and occasional bulkheads in the tunnel, all serious danger will be guarded against.

The Action of the Stove Association.

Elsewhere we publish a very full report of the semi-annual meeting of the National Association of Stove Manufacturers, held on Thursday of last week at Niagara Falls. With unusual expedition the business which usually covers two days was crowded into one, and, as the result, the discussion was short and the action with reference to prices decisive.

It will be remembered that at the winter meeting in New York, in February last, the association agreed to accept 6½ cents as the minimum selling price for common stoves. This price was not based on the price of iron, but was intended to make allowance for the decline which the conservative members of the committee thought it probable would occur before long in iron and labor. Had the "boom" continued it would have been necessary to sell stoves much above the basis to cover cost. As it is, however, the association has felt it necessary and expedient to reaffirm the 6½-cent basis, for reasons very fully set forth in the report presented by Mr. John S. Perry, as chairman of the committee, and in the discussion which preceded the unanimous rising vote adopting the report and reaffirming the basis of last winter. We believe this action will be conducive to the best interests of manufacturers and satisfactory to dealers. What the dealers want more than anything else is stability of prices. They know better than anyone else how demoralizing it is when manufacturers compete with themselves, and, to secure trade, cut their own and other people's prices. By its action above noted the National Association has done all in its power to give firmness and stability to prices, and to protect dealers against conditions unfavorable to their best interests. That the action of the association in reaffirming the 6½-cent basis is fully warranted, no one who knows the position and tendencies of the iron market, and who

has the information which will enable him to analyze the cost of stoves, can doubt. The outlook for the trade is certainly full of promise. Stocks are small, and the probabilities are that the fall demand will exceed the ability of makers to supply it. Firmness in the views of manufacturers is the best guarantee the dealer can have that he will be protected in his purchases if he anticipates his requirements by purchasing before the last moment, and the action of the National Association last week will go far toward establishing confidence in the minds of the trade.

The Glass Blowers and Belgian Workmen.

Our readers will remember the trouble that occurred in the glass works at Zanesville, Ohio, consequent upon the employment of a number of Belgians and the attempt on the part of the Glass Blowers' Union to prevail upon them to break their contract. An injunction was issued against the union, and the judge issuing it commented in no mild terms upon the rules of the union, and especially those that referred to foreign glass workers coming to this country.

As we have already announced, a delegation from the Glass Blowers' Union is, or was recently, in Belgium to endeavor to dissuade any more workmen from coming to this country, and we learn from the *Journal de Charleroi* that the delegation have issued an address or letter to the Belgian workmen, giving the reasons why they should not go to the United States. The chief of these reasons is that the men bound themselves by a contract, the union claiming that by so doing they "renounced their liberty of action."

If the Belgian glass blowers will think a moment they will see that this is simply a shrewd way of saying "don't come." These agents of the Glass Blowers' Union know that these contracts have been made mainly in the interest of the workman; that a man will not leave his country and go to another unless he is reasonably sure of employment, and to secure this employment he demands a contract binding the employer to furnish it for a given time. On the other hand, the employer, who generally advances the means to reach this country, insists that the workman shall work long enough to repay this advance. The union may reply that the men need not come, which is very true, and if they would say flatly, "we don't want you to come, and you shall not if we can prevent it," they would say just what they mean. This is not manifest in the address to the Belgian workmen. The address says: "We assure you that our association is by no means opposed to the immigration of foreign workmen if they 'come free,' &c. Either this is false or their laws do not mean what they say. In the Zanesville case, to which we refer above, a portion of the rules of the Glass Blowers' Association was put in evidence. In the decision of Judge Ball, published in our issue of January 29th, some of these rules are quoted. Section 7 of article 5 was quoted twice by Judge Ball. It reads as follows:

Section 7.—All window-glass blowers coming to this country, whether they have been sent for or come voluntarily, shall be required to wait for a place until all worthy and tried members of our assembly have secured work, and they shall be required to prove their character and workmanship by a residence of six months before being admitted into this order.

Commenting on this Judge Ball says:

Those who are sent for or come voluntarily to this country shall be required to wait for a place until all worthy members of the assembly have secured work, yet they are not permitted to become members until after six months' residence in this country. Here is a direct control assumed over workmen who are not only not members, but who are ineligible to membership. This association assumes to control two classes that are not subject to it, to wit: employers and emigrants less than six months in this country.

If this is not tyranny, compared with which a fair contract to give work is not only freedom, but license, we fail to get the meaning of "Section 7"; and yet with this rule among their by-laws they have the assurance and effrontery to go to Belgium to discourage emigration, and still further, to state that they are not opposed to foreign workmen coming to this country.

The census returns of population in Pennsylvania are showing some interesting features in the relations of manufacturing industry and growth of population. Almost without exception the purely agricultural counties of the State show a loss, or a very slight gain, in population—about 10 per cent. on the average. Those that are partly agricultural and partly manufacturing or mining communities show increase mainly in those portions in which the latter industries predominate, while the manufacturing and mining counties show an increase almost without exception. McKean County, with an increase of 3.80 per cent., tells the statistical story of the oil strikes, while Venango County, with a loss of about 10 per cent., tells of the decadence of its mushroom oil cities. Westmoreland County, under the influence of its coke manufacture, increases 36 per cent. The great coal fields of Clearfield County have added 65 per cent. to its population. The manufactures of Altoona have caused a growth in Blair County of 38 per cent. Chester's yards have given Delaware County 42 per cent. Lumber and oil have helped Elk County to 50 per cent. Allegheny County, with Pittsburgh, increases 34 per cent. Cambria has 31 per

cent. Dauphin, which includes Harrisburg, 29 per cent. Philadelphia 26 per cent.

We learn from English sources that the German pig-iron manufacturers have entered into an agreement for restricting the output of iron. The production is to be kept down to 15 per cent. less than last year, and by agreement makers are to be fined 10/ per ton for every ton they produce over and above the individual limit fixed by the trade for their works. This scheme may work very well in Germany, but the conditions there must be very different from what they are here if manufacturers will long submit to a penalty for doing what they will with their own. In this country such an agreement would not hold good for a month—certainly no longer than the conditions lasted rendering the making of pig iron unprofitable. The only way to keep an iron works idle is to lease it, or pay the proprietors as much for standing idle as they could make by running. Restricting the output of a works in operation is a mistake in every way. If a works is run at all, it is run to best advantage when it makes the largest product it can.

The American Institute of Mining Engineers.

The following "preliminary announcement" of the arrangements so far made for the Lake Superior meeting of the American Institute of Mining Engineers, has been issued: PITTSBURGH July 24, 1880.

The preliminary arrangements for the Lake Superior meeting of the American Institute of Mining Engineers have been completed sufficiently to enable us to make the following announcement:

The members living in the East will leave New York on the 20th of August (hour to be announced hereafter), reaching Chicago on Saturday, the 21st, where they will be joined by members from other sections, the party remaining in Chicago over Sunday. On the morning of Monday, the 23d of August, the party will leave Chicago on a special train, via the Chicago and Northwestern Railroad, reaching Marquette the same evening.

Arrangements have been made to have a steamer meet the party at Marquette, on which the members and ladies accompanying them will reside during their stay in the Lake Superior region, and on which excursions will be made to various points on the lake, including the copper regions, Thunder Bay, Silver Islet, and via Sault Ste. Marie and the Straits of Mackinaw, into Lake Michigan.

The committee are not prepared at the present time to give further details, but the meeting and excursions will be so arranged that the members can reach New York on their return not later than Saturday, the 4th of September.

Further details, as to route from New York, place of entertainment in Chicago, rates of fare, subsistence in the lake regions and the details of the excursions will be given in a subsequent circular.

As it is important to know at as early a date as possible how many will attend this meeting, every member who proposes being present is requested to fill out the blanks on the inclosed card and mail it at his earliest convenience. This is especially necessary in regard to accommodations on the steamer at Marquette. Respectfully,

W. P. SHINN, St. Louis, Mo., chairman,
JOS. D. WEEKS, Pittsburgh, Pa., sec'y,
Committee on Lake Superior Meeting.

The Seawanhaka Disaster.

On July 8th a commission from its own members, and consisting of nine persons, was appointed by the Grand Jury to examine into the causes of the disaster and the responsibility for it. The committee consisted of William Palmer, A. J. Merriman, J. Reid McIlvaine, Franklin P. Nesbitt, Horace M. Barry, J. E. J. Smith, Bernard Cregan, Charles L. Cammann and D. F. Calhoun. The Commissioners summoned before them on three separate days, soon after they were organized, James Ray, the mate; Edward Abel, the fireman, and Edward Weeks, the engineer of the burned steamer; Superintendent Kirk, the steamboat company's manager, and other persons, and subjected them to rigid and systematic examination. The services of Messrs. Calkin and Allen, two experts, were also obtained by the commission, these gentlemen acting not only as witnesses, but also as advisors in directing the form and scope of inquiry as to technical matters. Alexander Cauldwell, the Government Inspector, by whom the vessel's boilers were last officially inspected and reported on, was also examined, and other inspectors and experts were called to testify regarding the methods of inspecting and the sufficiency of the tests applied to boilers.

This evidence having been accumulated, the commission went up to Ward's Island and visited the wreck, taking with them Messrs. Allen and Calkin to examine the boilers critically. Their investigation of the condition of the boilers satisfied the commission that beyond a doubt the disaster was caused by the bursting of at least one of the boilers. In order to place the fact beyond a doubt, drawings were made of the fracture, and they cut out and brought away with them portions of the boiler shell and of some of the steam pipes. The pieces were taken from the part at which the fracture occurred, and show that the plate-iron had become weakened to such an extent that a blow from a hammer would break it. Some of the fragments taken from these boilers were corroded to such a degree that at the rough edges of the fractured part there were less than one-eighth of an inch in thickness, and at the line of the cut, made in severing them from the body of the plate, they were less than a quarter of an inch thick. The edges where the cut was made also looked as though the iron had undergone some form of decomposition, for the impact of the cold-chisel had scarcely brightened it, and it had much less weight than it should have. It is understood that

in the light of the testimony put before them, the commissioners are also of the opinion that the hydraulic system of testing boilers is defective, and does not give a true test of the strength of boilers—at least of old boilers.

Foreign Trade Statistics.

The chief of the Bureau of Statistics, in his twelfth monthly statement of the imports and exports of the United States for the year ended June 30, 1880, reports that the excess of exports of merchandise, stated in special values, was as follows compared with the previous year:

Month ended June 30, 1880, excess of imports	\$11,823,681
Month ended June 30, 1879, excess of exports	6,204,630
12 months ended June 30, 1880, excess of imports	167,984,359
12 months ended June 30, 1879, excess of exports	264,561,686

The excess of imports or of exports of gold and silver coin and bullion was as follows:

Month ended June 30, 1880, excess of imports	\$177,860
Month ended June 30, 1879, excess of exports	1,462,289
12 months ended June 30, 1880, excess of imports	75,891,301
12 months ended June 30, 1879, excess of exports	4,701,441

During the year just closed the value of the imports of merchandise into and exports from the United States was larger than during any preceding year in the history of the country. The value of the exports of merchandise during the year ended June 30, 1880, exceeded the value of the exports of merchandise during the preceding year about \$125,000,000, or 15 per cent., and the value of the imports of merchandise during the year ended June 30, 1880, exceeded the value of such imports during the preceding year about \$222,000,000, or 50 per cent. The increase of the value of the imports of merchandise exceeded the increase in the value of the exports nearly \$97,000,000.

The value of the imports and exports of merchandise during the fiscal year just closed exceeded the value of such imports and exports during the preceding year about \$347,000,000, an increase of 30 per cent. The rapid growth of the foreign commerce of the country is strikingly exhibited by the fact that the value of the imports and exports of merchandise during the fiscal year just closed amounted to \$1,503,679,480, being about 81 per cent. greater than the value of the imports and exports of 1879, and nearly 119 per cent. greater than the value of the imports and exports for 1860.

The exports of coin and bullion during the year ended June 30, 1880, were about \$7,800,000 less than during the preceding fiscal year, and the imports of coin and bullion exceeded the imports during the preceding fiscal year about \$72,700,000. During the year just closed, for the first time since 1861, the imports of coin and bullion exceeded the exports of the same.

Why the Tay Bridge Fell.

From the lengthy and valuable report by Messrs. W. Yolland and W. H. Barlow, two of the members of the Court of Inquiry on the Tay Bridge Disaster, we take the following summary of the conclusions reached by them. They state as their opinion:

1. That there is nothing to indicate any movement or settlement as having taken place in the foundations of the piers which fell.

2. That the wrought iron employed was of fair strength, though not of high quality as regards toughness.

3. That the cast iron was also fairly good in strength, but sluggish when melted and presented difficulty in obtaining sound castings.

4. That the girders that had fallen were of sufficient strength and had been carefully studied in proportioning the several parts to the duty they had to perform; in these girders some imperfections of workmanship were found, but they were not of a character which contributed to the accident, and the fractures found in these girders were, we think, all caused by the fall from the tops of the piers.

5. That the iron piers used in the place of the brick piers originally contemplated were strong enough for supporting the vertical weight, but were not of a sufficiently substantial character to sustain, at so great a height, girders of such magnitude as those which fell. That the cross-bracing and its fastenings were too weak to resist the lateral action of heavy gales of wind.

6. That the workmanship and fitting of the several parts comprising the piers were inferior in many respects.

7. That although a large staff of assistants and inspectors was employed, we consider that a sufficiently strict supervision was not exercised during the construction of that part of the work made at the Wormit Foundry. We think that the great inequality of thickness in some of the columns, the conical holes cast in the lugs, and several imperfections of workmanship which have been ascertained by this inquiry, ought to have been prevented.

8. That the arrangements for the supervision of the bridge after its completion were not satisfactory, inasmuch as it was entrusted solely to Henry Noble, who, although an intelligent man and very competent in the class of work to which he had been accustomed, possessed no experience in structures of ironwork, nor does it appear that he received any definite instruction to report as to the state of the ironwork of the bridge.

9. That Henry Noble, having become aware that many of the ties of the cross-bracing were loosened in October, 1878, ought at once to have informed Sir T. Bouch of this circumstance. Had he done so, there would have been ample time to have put in stronger ties and fastenings before the occurrence of the storm which overthrew the bridge.

10. That the ties of the cross-bracing had been tightened up and brought to their bearing before the date of the inspection by General Hutchinson, and the fact that many of them became loose so soon afterward, was an evidence of weakness in this part of the structure, and of a departure from the proper inclination or batter of the columns where it occurred, and we think that the

loosening of the ties to an extent sufficient to permit the insertion of pieces of iron one-quarter or three-eighths of an inch thick indicated a considerable change of form of the pier, and rendered it doubtful if the ties could have recovered their form when the wind action ceased. The employment of packing pieces under such circumstances might have had the effect of fixing the parts of the structure where they were applied in their distorted form.

11. That, notwithstanding the recommendation of Gen. Hutchinson that the speed of the trains on the bridge should be restricted to 25 miles per hour, the railway company did not enforce that recommendation, and much higher speeds were frequently run on portions of the bridge.

12. That the fall of the bridge was occasioned by the insufficiency of the cross-bracing and its fastenings to sustain the force of the gale on the night of December 28, 1879, and that the bridge had been previously strained by other gales.

13. That although the general bearing of the evidence indicates the cross-bracing as being the first part to yield, yet it is possible that the fall of the bridge may have been occasioned by a fracture, or partial fracture, in one of the outward leeward columns, produced by causes analogous to those which fractured other columns shortly before the accident; for if a fracture, or partial fracture, of a dangerous character occurred in one of these columns, the extra strain brought on by the force of the gale, accompanied by the weight and tremor of the train, might have led to its final rupture.

14. That the first or southern set of continuous girders, covering five spans, was the first that fell after the engine and part of the train had passed over the fourth pier, and that the two consecutive sets of continuous girders, each covering four spans, were in succession pulled off the piers, on which their northern ends rested, by the action of the first set of continuous girders falling over, and probably breaking some of the supporting columns.

15. That the extent of the work which fell must be attributed to the employment of long continuous girders, supported by piers built up of a series of cast-iron columns of the dimensions used.

METALLURGICAL NOTES.

WELDING CAST STEEL.

Two points must be taken into consideration chiefly in effecting the welding of steel: It is necessary to render the film of oxidized iron on the surfaces to be united by welding as fluid as possible, and some means must be found to restore to the steel the carbon eliminated during the process of heating to the welding temperature. According to the *Revue Industrielle*, M. Rust considers boric acid the most effectual in performing the former, and ferrocyanide of potassium in doing the latter. M. Rust considers the functions of the ferrocyanide to be also to restore to the steel nitrogen, upon which he looks as an important constituent of the metal. In 1850 a workman of Mulhouse, Alsace, sold the following receipt for a welding compound: 64 parts of borax, 20 parts of sal ammoniac, 10 parts of ferrocyanide of potassium, and 5 parts of colophonium. M. Rust changed it as follows: 61 parts of borax, 17½ parts of sal ammoniac, 16½ parts of ferrocyanide, and 5 parts of colophonium. He states that with the acid of this compound, welding may be accomplished at a yellow red, or at a temperature between the yellow red and white, and that no treatment is necessary after welding. The borax and sal ammoniac are powdered, mixed and are slowly heated until they melt. Heating is continued until the strong odor of ammonia ceases almost entirely, a small quantity of water being added to make up for that lost by evaporation. The powdered ferrocyanide is then added, together with the colophonium, and the heating is continued until a slight smell of cyanogen is noticed. The mixture is allowed to cool by spreading it out in a thin layer. During the process given, boric acid and chloride of sodium are formed, ammonia being expelled. The same product may, therefore, be obtained by mixing 41.5 parts of boric acid, 35 parts dry chloride of sodium or salt, 15.5 to 26.7 parts of ferrocyanide of potassium, 7.6 parts of colophonium, and 3 to 5 parts of dry carbonate of soda. The only trouble with this mixture, which gives the same results, is that it decomposes easily unless it is kept in a dry place.

THE WESTMAN KILN AT KATAHDIN FURNACE.

Mr. Ernst Sjöstedt, a Swedish mining engineer and agent in this country for the Westman kiln for roasting iron ores, has published in *Jern Kontorets Annaler* an account of the work of the kiln referred to at the Katahdin charcoal furnace, Bangor, Me. The principal ores used contain, respectively, 73.5 and 68.0 per cent. of protoxide of iron, 1.0 per cent. of manganese, 1.0 and 1.5 per cent. of lime, 3.0 and 4.0 per cent. of alumina, 4.0 and 7.5 per cent. of silica, 16.5 and 15.0 of water, 1.0 and 3.0 per cent. of sulphur, and 0.037 and 0.02 per cent. of phosphorus. Formerly the ore was roasted in open heaps, and the pig ranged from 1.36 to 4.01 in silicon, and up to 0.34 per cent. of sulphur. A large quantity of lime, rapid smelting, closed top, increased height, were tried in vain to improve the quality of the metal. It was found, finally, that the cause of the poor quality of the pig was the high percentage of sulphur in the ore. A Westman kiln was introduced, and the percentage of the noxious ingredient fell to 0.02 to 0.05 per cent. The roasted ore yielded a light gray pig of excellent quality, containing 2.987 of graphite, 0.50 of combined carbon, 1.043 per cent. of silicon, 0.047 per cent. of sulphur, and 0.070 per cent. of phosphorus. Mr. Sjöstedt states also that the consumption of charcoal was reduced by 40 per cent.

French Railways.—The new railways now under contract will increase the French lines from 13,790.73 miles to 24,855 miles. Most of the work will be done under the superintendence of the government agencies, and the lines will be managed under state supervision, but not at government expense. The freight tariff is lower than in any other country except Belgium.

Special Notices.

To Iron Manufacturers
FOR SALE.

The ROLLING AND PUDDLING MILLS of the late Hudson River Iron Co., at Poughkeepsie, New York. This property is well situated on the Hudson River and New York Central and Hudson River Railroad, and is in good condition for immediate occupancy. It contains all the machinery necessary for the manufacture of Merchant Iron, Rail and Bolt Spikes, Bolts, &c. Parties in search of this kind of property are invited to examine, and for other particulars to address

W. S. JOHNSTON, Trustee,
Poughkeepsie, N. Y.

TOOLS FOR SALE.

Iron Planer, 9 foot bed, 36 x 36, with extension rack, 7 foot bed, 30 x 33.
Engine Lathe, 13 foot bed, 33 in. swing, with boring table 24 x 36.
Engine Lathe, double head, both heads back geared, 12 foot bed, 16 in. swing, with "Merriman" bolt cutter head attached, dies to cut 1/2 to 1 1/2 bolts, with extra rest for holding bars.
Heavy new turret head Lathe.
No. 1 Compound Planer or Shaping Machine, planes 34 x 10 x 20 in. circle.
Edging Machine - Windsor.
One Heavy Grindstone (8 in. face), arbor and boxes. New.
No. 2 Heavy back-geared Pillar Drill, 18 in. from pillar to spindle, 42 in. from floor plate to spindle; floor table, 64 x 36; revolving table, 25 in. diameter.
Two 2-Spindle Drills, tables 14 x 20.
One 2-Spindle Drill, table 12 x 15.
Several special drilling and counterboring machines.
Dead Stroke Power Hammer, new, 100-lb. ram, latest pattern, made for Exhibition at Philadelphia in 1876.
300-lb. Peck Drop Hammer, complete except bed.
New Oneida Lathe Chucks, 4 in., 6 in., 3 in., 12 in. Lot of heavy Drills, Taps, Reamers, &c., from 1/4 to 1 1/2 inches.
Having no use for above, will sell them cheap.

F. A. HULL & CO.,
Manfrs. of the Danbury Drill Chuck. Danbury, Ct.

Valuable Patterns For Sale.

A complete set of Wood and Metal Patterns for Ornamental Cemetery Railing Fittings with Metal Core Boxes, also Brass Patterns with boxes for Tulip Eyes. These patterns are new in design, were made to order by one of the most skillful carvers in the country and have never been used. This set could not be replaced for less than \$350, but will be sold at a bargain, as the present owner has no use for them. This is a rare opportunity for a Railing Maker or Architectural Iron Worker to secure a valuable set of patterns at a nominal figure. Address

PANCOAST & MAULE,
243 and 245 South Third St., Philadelphia.

Wanted.

A competent man, acquainted with the manufacture of Grain Cradles and Snaths, capable of taking the position of Foreman in a large factory.

Address J. B.,
Office of The Iron Age, 83 Reade Street, N. Y.

OFFICE OF
BRANFORD LOCK WORKS,
BRANFORD, CONN., July 17, 1880.

WE have this day made our discount on Shutter, Drawer and Picture Knobs 50 per cent. instead of forty-five per cent. In addition to above an extra 10 per cent. will be allowed for prompt cash in thirty days.

BRANFORD LOCK WORKS.

Business for Sale, to Close an Estate.

Established 1838.

Has always done a profitable business. Dealers in Steam Fittings, Engineers' Supplies, Copper, Tin and Sheet Iron Work. Will not require a very large capital.

DUDLEY BROS.' ESTATE,
61 Main St., Buffalo, N. Y.

For Sale.

A WOODRUFF & BEACH BEAM ENGINE. Cylinder, 42 in. x 84 in. Can now be seen running in Brass Rolling Mills of the subscribers, at Thomaston, Conn. Will be taken out early this fall.

THE PLUME & ATWOOD MFG. CO.

Wanted.

A situation, by a practical Chemist and Metallurgist (four years a graduate of the School of Mines at Stockholm), with practical experience in the manufacture of Charcoal and Anthracite Pig Iron, Iron and Steel, and in analyzing all inorganic substances. Best of references and testimonials. Address

BOX 1880,
Office of The Iron Age, 83 Reade St., New York.

Barb Fencing.

Makers of FOUR BARB WIRE FENCING, desirous of selling right to manufacture in England, will please address

BOX 1050 P. O.,
Montreal, Canada.

A PRACTICAL FOUNDRYMAN desires a situation as Foreman. Has held such position for last two years; age, 28; temperate. Can furnish the best of reference from last employer and others. Address

WM. H. HOLDSWORTH,
238 Steuben St., Brooklyn, N. Y.

FOR SALE.

Steam Engine, 6 x 12, with 15-horse-power boiler, feed pump and heater, nearly new and in good order. Two (2) second-hand "Peck" Drop Lifters, not geared; will raise hammers of 350 lbs. weight each. Second-hand sheet metal or poppet drop, 16 in. die space, good order.

BEECHER & PECK,
Lock Box 122, New Haven, Conn.

Notice to Consumers of Fine Light and Medium-Weight Gray Iron Castings.

NORTH BROTHERS have leased the Foundry, N. W. cor. Twenty-third and Race Streets, Philadelphia, and so forth correspondence with the trade.

SITUATION WANTED—By a first-class B. ACK-SON, to take charge of a shop; experienced in dies and hammer. Address

2241 Ingersoll St., Philadelphia, Pa.

Special Notices.

SECOND-HAND
and NEW TOOLS
FOR SALE LOW.

July List No. 1.

Miscellaneous Second-Hand Tools.

All in Good Order, and will be sold very low

One Engine Lathe, 56 in. swing x 18 ft. bed.
One Engine Lathe, 36 in. swing x 15 ft. bed.
One Engine Lathe, 36 in. swing x 18 ft. bed.
One Engine Lathe, 17 in. swing x 10 ft. bed.
One Engine Lathe, 20 in. swing x 6 ft. bed.
One Engine Lathe, 20 in. swing x 6 ft. bed.
Seven Engine Lathes, 18 in. swing x 7 1/2 ft. bed, chain feed.
One Horizontal Boring Lathe.
Two Wood-Turning Lathes.
One Shafting Lathe, 24 in. swing x 26 ft. bed.
One Shafting Lathe, 22 in. swing x 22 ft. bed.
One Speed Lathe.
One Polishing Lathe, 20 in. swing x 20 ft. bed.
One Polishing Lathe, 25 in. swing x 22 ft. bed.
One Pulley Lathe, double head.
Two Spinning Lathes.
One Iron Planer, 60 in. x 60 in. x 30 ft.
One Iron Planer, 24 in. x 4 ft.
One Upright Drill, 60 in.
One Upright Drill, 38 in.
One Upright Drill, 16 in.
One Bench Drill.
One Upright Boring Machine, 78 in.
One Pulley Polishing Machine.
One No. 2 Bolt Cutter.
One Pointing Screw Machine.
One Daniels Planing Machine.
Three Speed Lathes, 6 ft.
Three Bolt Cutters, various sizes.
One No. 2 Bolt Cutter.
One new "Hardaway" Bolt Heading Machine, to head up to 1 1/2 in. bolts.
One new "Hardaway" Bolt Heading Machine, to head up to 1 1/2 in. bolts.
A lot of Wood Working Machinery.
Two Profiling Machines, Two Spindle.
Six Small Punching Presses.
One N. Y. Safety Steam Power Co. Upright, 15 H. P. Engine and 20 H. P. Upright Boiler with all connections, &c.

NEW TOOLS, Very Low.

Five No. 2 Bolt Cutters, Wood & Light.

A complete set of Shafting
& Pulley Lathes, new.

One 15-inch Shaping Machine.

Please specify which of the above tools you want and we will forward all particulars.

STEAM LAUNCH.

40 ft. x 7 ft.; draws 3 ft.; Engine, 5 1/2 x 9; Boilers, 12 x 48. Fitted with carpets, &c., for pleasure.

A Woodruff & Beach
Beam Engine,

Low pressure, 42-inch cylinder, 84 inch stroke, with fly-wheel pulley 20 feet diameter, 36 inch face, and

Four Tubular Boilers,

60 inches in diameter, 20 feet long, and all connections practically as good as new.

For sale by

The Geo. Place Machinery Agency,
121 Chambers and 103 Reade St.,
NEW YORK.

Special Inducements

OFFERED IN

REFINED IRON,
COMMON IRON,
TOE-CALKING STEEL,

Square and Hexagon Nuts,

L. W. R. O. Horse Shoe Iron,

Delivered in New York.

Send specifications of your wants, and allow us to quote you prices.

C. S. Mersick & Co.,

New Haven, Conn.

For Sale.

The following New and Second-Hand Engines, Boilers, &c.:

NEW.
10-horse Vertical Engine, \$275; 15-horse Horizontal Engine, \$255; 5-horse do., \$150; 4-horse do., \$125; 3-horse do., \$100; 2-horse do., \$80; 1-horse do., \$60; 4 and 6-horse Portable Engines and Boilers; 8-horse Vertical Boiler, \$175; 15-horse do., 20-horse Horizontal Boiler, \$275; 30-horse do., \$425.

SECOND-HAND.
8-horse Horizontal Engine, \$250; 10-horse do., \$275; 15-horse do., \$295; 3-horse Vertical Engine, \$75; 2-horse do., \$65; 15-horse Horizontal Boiler, \$225; 20-horse do., \$250; 15-horse Locomotive Boiler, \$250; 40-horse Horizontal Boiler, \$550; 12-horse Vertical Boiler, \$150; 3-horse do., \$75; 4-horse do., \$100; 4-horse do., \$80; Back Geared Lathe, 3-feet shears, 12-inch swing, \$35.

LOVEGROVE & CO.,
152 N. Third St., Philadelphia, Pa.

For Sale.

Stock of hardware, stoves and implements, and store furniture, in one of the best towns in Kansas.

Address

HARDWARE,
Box 66, Salina, Kansas.

WANTED—Situation as Assistant Superintendent in iron or steel works. Has a thorough technical education and two years' practice; can give best of references. Address

IRON AND STEEL, Box 283, New York.

Special Notices.

A LARGE ASSORTMENT
OF

New and Second-Hand Machinery.

STEAM ENGINE MACHINERY.

One Delamater Sugar-house Engine 26 in. x 48 in.
One Corlies 40 horse power, 10 in. x 24 in.
Five Horizontal Engines, new 9 in. x 16 in.
Four " " " " 8 in. x 12 in.
One Portable Engine, 5 horse power.
One Horizontal Engine, 11 in. x 18 in., Whitehall & Hampden.
One Upright Engine, 16 in. x 16 in. [forty].
One Horizontal Engine, 15 1/2 in. x 30 in., Todd & Raf.
One Upright Engine, 7 1/2 in. x 10 in.
One " " and Boiler complete, 5 H. P.
One 25 h. p. Horizontal Engine and Upright Boiler.
One Boiler, 5 ft. x 15 ft. 83 in. Tubes.
Two " " 5 ft. x 14 1/2 ft. 100 2 1/2 in. Tubes.
MACHINISTS' TOOLS.

One Gear Cutter and Milling Machine combined (new.)

One Vertical Boring Mill, bore from 26 to 30 inches.

One Shaper, 6-inch stroke, 11 feet between columns.

One Turn Table and Boring Mill, 11 feet between Two Slabbing Machines.

One Lathe, 18 in. x 8 ft., Screw Cutting.

One " " 14 in. x 5 ft.

One Merrill Compressed Air Hammer, Hotchkiss Patent.

One Punch and Shears combined, will punch 1 1/2 inch hole in 1-inch iron in the center 30 in.

One large Shear, will cut 3/4 iron any size.

Two Emley Drills.

One New Haven Mach. Co. Drill, will bore in center 60 in.

One New Haven Mach. Co. Drill, will bore in center 30 in.

One New Haven Planer, 37 in. x 9 ft.

7000 lbs. 1/4 Plate Iron, for safes.

One Lathe, 32 in. x 20 ft. bed.

One " " 28 in. x 20 ft.

One " " 16 in. x 7 ft.

One Pattern Makers' Lathe.

One Planer, 42 in. x 16 ft.

One " " 24 in. x 5 ft.

One Crank Planer, 18 in. x 22 ft.

One Travis' Boring Machine.

Eighteen Drilling Machines.

One Rock Blower.

One Bogardus Mill, No. 5.

One Pair Hand Shears, Pond's Patent.

One Large Power Punch for bridge work.

One 300-ton Hydraulic Press and Pump.

One Dugdon Beam Punch.

One Upright Drill, to the center of 64 in.

One " " smaller.

One Hand Punch to the center of 36 in.

One " " smaller.

One hundred Vices.

PUMPS.

One Knowles Special Pump, No. 7.

One Woodward Steam Pump, No. 4.

One Guld & Garrison Steam Pump, No. 3.

One Woodward Steam Pump, No. 1.

Six Hardick Steam Pumps, from No. 1 to No. 4.

J. GRAY'S MACHINERY DEPOT

37 Dey Street, New York, U. S. A.

For Sale.

26 in. x 10 ft. Engine Lathe. N. Y. S. Engine Co.

30 in. x 20 ft. Engine Lathe. Sellers & Co.

30 in. x 6 ft. Engine Lathe. Sellers & Co.

Three Column Drills, 38 in., 18 in., 12 in. swing.

Suspension Drill. Springfield Tool Co.

Fox Lathe. American Machine Co.

Two Polishing Lathes, double ended.

Two No. 6 Sturtevant Blowers, one exhaust.

2-in. Pipe Cutter. Morris, Tasker & Co.

Vertical Engines, 5 x 6, 7 x 10, 8 x 6, 12 x 12.

Vertical Boilers, 3 to 20 horse power.

Horizontal Engines, 4 to 40 horse power.

Ingersoll Rock Drill and 50 ft. of Hose.

A. G. BROOKS & WINEBRENER,
261 North Third St., Philadelphia.

FOR SALE.

A works completely equipped for the manufacture of Carriage Axles—well located in relation to coal and iron, also very accessible to market.

Address E. F. BULLARD,
14 Dey St., New York.

The Sherman Process Co.

9 Pemberton Square, Boston, Mass.

Issue Licenses to use the Process for the

Manufacture of Iron and Steel

In the Bessemer Converter, Crucible, Siemens-Martin, Puddling, Blast and Cupola Furnaces.

The use of this Process improves the quality of the product, saves fuel and labor, and does not require any change in furnace or manner of working. See page 17 of The Iron Age of Oct. 25th 1877.

FOR SALE.

RICHMOND CUTLERY WORKS. Good Engine and Boiler, Power Hammers, Punching Presses, and all kinds of machinery generally used in a cutlery and edge-tool manufactory. If sold soon for cash will be sold at a great bargain. Address

RICHMOND CUTLERY CO.,
Richmond, Ind.

HAMMACHER & DELIUS,

Hamburg, Germany,

62 Alter Wall,

Solicit correspondence with American Manufacturers and Inventors in regard to representation in European countries.

WE have commenced the manufacture of

Japanned Wrought Iron Padlocks,

And are now prepared to fill orders for the leading numbers on favorable terms.

NORWICH LOCK MFG. CO.,
Norwich, Conn.

To Iron Manufacturers and Capitalists.

FOR SALE—Three valuable Patents: One Fifth-Wheel Bender, bends them cold and defies competition; one Flour Mill Spindle, and one Can Caping Iron. A rare chance for a live man with capital. For particulars, address

G. A. SCHALL,
Cor. Second St. and Market Space,
Baltimore, Md.

FOR SALE.

A stock of Hardware in one of the best towns of its size in the State. Business established in 1850. The death of George H. Humphreys, of the firm of Rowan and Humphreys, necessitates the closing out of our stock. This is a rare opportunity for any party wanting to engage in trade. Our trade for the past twenty years has been very prosperous. Address

JEROME ROWAN, Batavia, N. Y.

Sanderson Bros Steel Co.

A limited number of shares for sale by

EDWARD FRITH & SON,
241 Pearl Street, New York.

Special Notices.

1880. PITTSBURGH
EXPOSITION SOCIETY

THE FOURTH

EXPOSITION AND FAIR

Will open to the public

THURSDAY, September 2,

And remain open Day and Evening (Sundays excepted) until

SATURDAY, October 9, 1880.

Blank forms of Application for Space, Prospectus and Premium List may be had by addressing the Secretary.

Exhibitors are earnestly requested to make early application for space, thus enabling the managers to better arrange the whole exhibition.

New Machinery Hall, New Engine & Boilers.

Manufacturers and inventors should avail themselves of the unsurpassed opportunity afforded by this Exposition to introduce to the notice of the public their new machinery.

Office, GERMANIA BANK BUILDING,
89 Wood Street,
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J. G. PATTERSON, Secretary.

K. P. Young, General Manager.

John D. Bailey, Asst. Manager & Cashier.

E. S. Wheeler & Co.,

IRON MERCHANTS,

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Exporters of all brands of

Scotch & English Pig Iron.

c. f. i. to America and f. o. b. British ports.

Old Iron Rails, Puddled Bars

AND MANUFACTURED IRON.

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STEEL:

Its History, Manufacture, Properties, and Uses.

By J. S. JEANS,

Secretary of the Iron and Steel Institute.

Section I. History of Steel: Chap. 1. History of Steel; 2. Early History in England; 3. Progress of Invention; 4. History of Bessemer Process; 5. Siemens-Martin Process; 6. Other Steel-making Processes; 7. Steel in America; 8. Germany; 9. France; 10. Austria; 11. Russia; 12. Sweden; 13. Other Countries.—Section II. Manufacture of Steel: Chap. 14. Cementation and other Methods; 15. Manufacture by Bessemer Process; 16. Siemens-Martin Process; 17. Other Methods.—Section III. Chemical and Physical Properties of Steel: Chap. 18. Phosphorus in Steel; 19. The Use of Manganese; 20. Sulphur in Steel; 21. Sulphur in Steel; 22. Silicon in Steel; 23. Tensile Strength of Steel; 24. Mechanical Tests of Steel; 25. Analysis of Steel.—Section IV. Uses of Steel: Chap. 26. Application of Steel to Railway Purposes; 27. To Shipbuilding; 28. To Bridge Building; 29. To General Purposes; 30. Guns and Armor Plates; 31. Other Purposes.

Price.....\$14.50

For Sale by

DAVID WILLIAMS,
83 Reade St., New York.

For Sale.

A new WILCOX, SHINKLE & CO. IMPROVED

ROLL LATHE, with spiral gearing; heavy cast bed frame, 30 ft. x 3 ft. 6 in. wide; swings 36 in.; Roll Boxes for 22 in.,

Trade Report.

Office of THE IRON AGE,
WEDNESDAY EVENING, July 28, 1880.

During the past week the financial markets have been fairly active. A favorable influence has been exerted on the stock market by the increased earnings of the railroads, and also by the news from the West concerning the condition of the crops.

The importations of specie and bullion at this port during the week ending July 23 amount to \$20,278, including \$9,025 gold and \$11,253 silver. Since the 1st of January the importations will reach \$5,010,167, consisting of \$1,900,656 gold, \$3,099,432 silver, and \$1079 brass and copper coin. From the 1st of August, 1879, to July 16, 1880, there has been a total importation of \$33,017,829, of which \$77,168,997 is gold and \$5,848,832 silver.

The ruling rate for call loans in the local money market has been 2 1/2 %.

Government bonds have been strong throughout the week, and the four per cent have advanced. The offerings of bonds for the sinking fund amounted to \$4,590,650, of which the Treasury accepted \$2,000,000, all five and sixes.

State bonds have been dull and steady. Railroad bonds have been strong, and prices have advanced. The most important transactions were in the Erie, Kansas Pacific, Kansas and Texas, Texas Pacific, C. C. and I. C. and Denver and Rio Grande issues.

The stock market has been strong, and, with slight reactions, prices have advanced. The principal dealings were in Erie, Lake Shore, Kansas and Texas, Northwest, Milwaukee and St. Paul, Delaware, Lackawanna and Western and Jersey Central.

The bank return shows a loss of \$1,878,675 in surplus reserve, which now stands at \$16,592,600, against \$17,390,950 at this time last year, and \$22,571,775 at the corresponding period in 1878. The loans show a gain this week of \$2,208,300, the specie is down \$1,556,600, the gold tenders are decreased \$54,200, the deposits other than United States are down \$968,500, and the circulation is decreased \$25,200.

The following is an analysis of the bank totals of this week compared with that of last week:

	July 17.	July 24.	Comparisons.
Loans.....	\$23,100,000	\$24,517,800	Inc. \$2,417,800
Specie.....	70,615,000	69,058,900	Dec. 1,556,100
Legal tenders.....	20,915,000	20,351,000	Dec. 564,000
Tot. reserve.....	91,530,000	90,410,000	Dec. 1,120,000
Deposits.....	292,335,000	291,270,000	Dec. 965,000
Reserve re-quired.....	73,059,635	72,817,500	Dec. 242,135
Surplus.....	18,471,275	16,592,600	Dec. 1,878,675
Circulation.....	19,488,700	19,463,500	Dec. 25,200

The foreign trade movements at the port of New York since our last issue are shown in the following tables:

For the week ended July 24:

	1878.	1879.	1880.
Dry goods.....	\$1,368,042	\$2,328,040	\$3,053,849
General mds.....	4,572,248	3,205,803	6,514,638

Total for week..... \$5,940,290
Prev. reported..... \$7,533,843
Since Jan. 1..... \$15,778,213

Included in the imports were items of merchandise valued as follows:

	Quantity.	Value.
Anvils.....	24	\$1,274
Brass goods.....	24	3,478
Bronzes.....	18	2,135
Chains and anchors.....	67	3,389
Copper.....	18	18,533
Cutlery.....	68,537	68,537
Pins.....	45	2,097
Guns.....	89	15,748
Hardware.....	33	3,813
Iron, hoop, tons.....	3,813	3,813
Iron, pig, tons.....	6,857	145,285
Iron, sheet, tons.....	250	30,538
Railroad bars.....	37,435	891,640
Iron ore, tons.....	2,000	20,000
Iron, other, tons.....	13,488	393,902
Metal goods.....	448	26,324
Nails.....	6	1,731
Needles.....	2	7,619
Nickel.....	4,653	4,653
Old metal.....	7	7,379
Plated ware.....	7	1,262
Perforated caps.....	10	1,336
Saddlery.....	3	3,805
Steel.....	5	5,305
Spelter.....	220,460	9,221
Silverware.....	3	3,980
Tin, bxs.....	29,080	147,617
Teasles.....	1	1,053
Tin, b. 141 slabs; 570,237 lbs.....	50,992	50,992
Wire.....	71	7,897

For the week ended July 27:

	1878.	1879.	1880.
For the week.....	\$7,018,127	\$6,748,315	\$8,683,913
Prev. reported.....	182,575,688	159,776,614	216,154,520

Since Jan. 1..... \$189,593,815

For the week ended July 24:

	1878.	1879.	1880.
Total for week.....	\$81,081	\$81,081	\$81,081
Previously reported.....	4,848,047	4,848,047	4,848,047

Government bonds at the close were quoted as follows:

	Bid.	Asked.
U. S. 6's 1880 registered.....	101 1/2	102 1/2
U. S. 6's 1880 coupon.....	101 1/2	102 1/2
U. S. 6's 1881 registered.....	104 1/2	105 1/2
U. S. 6's 1881 coupon.....	104 1/2	105 1/2
U. S. 5's 1881 registered.....	102 1/2	103 1/2
U. S. 5's 1881 coupon.....	102 1/2	103 1/2
U. S. 4's 1881 registered.....	111 1/2	112 1/2
U. S. 4's 1881 coupon.....	111 1/2	112 1/2
U. S. 4's 1882 registered.....	109 1/2	110 1/2
U. S. 4's 1882 coupon.....	109 1/2	110 1/2
U. S. Currency 6's 1880.....	125	125
U. S. Currency 6's 1881.....	125	125
U. S. Currency 6's 1882.....	125	125
U. S. Currency 6's 1883.....	125	125
U. S. Currency 6's 1884.....	125	125
U. S. Currency 6's 1885.....	125	125

The following were the closing quotations of active shares:

	Bid.	Asked.
Quicksilver.....	15 1/2	16 1/2
Houston and Texas.....	45	51 1/2
Delaware, Lack. and Western.....	8 1/2	9 1/2
Delaware and Hudson Canal.....	81 1/2	82 1/2
Bur. Cedar Rapids and North.....	68 1/2	69 1/2
Louisville and Nashville.....	118	121
Nashville and Chattanooga.....	68 1/2	69 1/2
Keokuk and Des Moines.....	11 1/2	12 1/2
St. Paul.....	25	26 1/2
Kansas and Texas.....	107 1/2	108 1/2
C. C. and I. C.....	37 1/2	38 1/2
Canada Southern.....	62 1/2	63 1/2
American District Telegraph.....	75 1/2	76 1/2
Northern Pacific.....	37 1/2	38 1/2
St. Paul and Omaha.....	43 1/2	44 1/2
St. Paul, M. and Omaha Pref.....	78 1/2	79 1/2
Morris and Essex.....	107 1/2	108 1/2
San Francisco.....	39 1/2	40 1/2
New York Elevated.....	119	120
Clev. Col. Cn. and Ind.apolis.....	71	72
Lincoln Central.....	105 1/2	106 1/2

Ontario Silver.....	33	33 1/2
Little Pittsburgh.....	3 1/2	3 3/4
Silver Cliff.....	4 1/2	4 3/4
Central Arizona.....	5 1/2	5 3/4
Western Union Telegraph.....	107 1/2	108 1/2
Pacific Mail.....	41 1/2	42 1/2
Michigan Central.....	33 1/2	34 1/2
Ohio.....	33 1/2	34 1/2
Marquette and Cincinnati Pref.....	7 1/2	7 3/4
Lake Erie and Western.....	32 1/2	33 1/2
Lake Shore.....	108 1/2	109 1/2
New Jersey Central.....	75 1/2	76 1/2
Union Pacific.....	91 1/2	92 1/2
Central Pacific.....	73 1/2	74 1/2
Ontario and Western.....	26 1/2	27 1/2
New Central Coal.....	26	27
Chicago, St. Louis and New Orleans.....	33 1/2	34 1/2
Chicago and Alton.....	12 1/2	13 1/2
Burlington and Quincy.....	12 1/2	13 1/2
Panama.....	17 1/2	18 1/2
Erie.....	43 1/2	44 1/2
Hannibal and St. Joseph.....	25 1/2	26 1/2
Iron Mountain.....	52 1/2	53 1/2
New York Central.....	18 1/2	19 1/2
Reading.....	18 1/2	19 1/2
Manhattan Railway.....	25 1/2	26 1/2
Metropolitan Elevated.....	91	92
New York Elevated.....	110	111
Carroll.....	12	13
Sutro Tunnel.....	15 1/2	16 1/2
Express-Adams.....	110	111
Wells, Fargo & Co.....	105 1/2	106 1/2
United States.....	48 1/2	49 1/2
Rock Island.....	110 1/2	111 1/2
Atlantic and Pacific Telegraph.....	44 1/2	45 1/2
Alton and Terre Haute.....	6 1/2	6 3/4
Northwest.....	95 1/2	96 1/2
Wabash.....	114 1/2	115 1/2
Penn. Lock Works.....	75 1/2	76 1/2

MINING STOCKS.

The quotations of active mining stocks at the close were as follows:

	Bid.	Asked.
Amie.....	87	89
American Flag.....	33	37
Bechtel.....	1 1/2	1 1/2
Buckeye.....	28	29
Bulwer.....	2 1/2	2 1/2
Bodie.....	4 1/2	5 1/2
Calaveras.....	1 1/2	1 1/2
Caledonia.....	1 1/2	1 1/2
California.....	1 1/2	1 1/2
Climax.....	2 1/2	2 1/2
Consolidated Virginia.....	2 1/2	2 1/2
Consolidated Imperial.....	1 1/2	1 1/2
Chrysolite.....	1 1/2	1 1/2
Dahonega.....	7	8
Durango.....	44	45
Eureka.....	14 1/2	15 1/2
Great Eastern.....	58	59
Gold Placer.....	64	64
Goodshaw.....	90	110
Granville.....	11	11
Great Mountain.....	3 1/2	3 1/2
Hukill.....	1 1/2	1 1/2
Horn Silver.....	15 1/2	16 1/2
Independence.....	37 1/2	37 1/2
Lacrosse.....	37	37
Lucerne.....	13	14
L. Chief.....	4 1/2	5 1/2
M. White.....	21	21
Mayfield.....	21	21
Pumas.....	1 1/2	1 1/2
Rappahannock.....	20	30
South Bulwer.....	50	50
Silver Cliff.....	4 1/2	4 1/2

GENERAL HARDWARE.

Business continues fairly active, and few changes in values have occurred during the week.

A meeting of the Lock manufacturers was held at New Haven, Conn., to-day. Existing prices and terms were confirmed, and the meeting adjourned without further action.

During the week the agents of the Nail manufacturers in this city held a meeting, at which the base price of rod, to 60d, was advanced to \$3 per keg, net. At this figure the market is firm and the demand is generally reported active. The leading sizes of Nails are in unusually light supply.

The Western Nail Manufacturers' Association held a meeting in Pittsburgh to-day, at which the selling price was advanced to \$3 per keg for rod, to 60d., subject to the usual quantity and cash discounts. The card remains unchanged. This is an advance on the selling price of 25 cents a keg.

The Branford Lock Works, in an advertisement which appears on the opposite page, announce, under date of the 17th inst., that they have changed the discount on Shutter, Drawer and Picture Knobs to 50 per cent, instead of 45 per cent., as formerly; and, in addition, an extra discount of 10 per cent for prompt cash in 30 days will be allowed.

John Chatillon & Sons have issued the following discount sheet, under date of the 15th inst.:

[No. 3.]

DISCOUNTS FROM LIST PRICES

In Catalogue of January 1, 1880, of John Chatillon & Sons.

	Page.	Dis. per cent.
7. Brass Sportsman's Balances.....	25	25
8. Letter Balances.....	25	25
8. Combination Letter Balances.....	25	25
9. Paper Weights.....	25	25
10. Postal Scales.....	30	30
11. Light Spring Balances.....	150	150
12. Straight.....	150	150
16. Tubular Ice Spring Balances.....	150	150
17. Iron and Ice Spring Balances.....	150	150
18-19. Circular Spring Balances.....	150	150
44. Circular Spring Balances, Large Dial, new list Nos. 4250, 4100, 4266, 4200, 4276, 4210, 4215, 4216, 4217, 4218, 4219, 4220, 4221, 4222, 4223, 4224, 4225, 4226, 4227, 4228, 4229, 4230, 4231, 4232, 4233, 4234, 4235, 4236, 4237, 4238, 4239, 4240, 4241, 4242, 4243, 4244, 4245, 4246, 4247, 4248, 4249, 4250, 4251, 4252, 4253, 4254, 4255, 4256, 4257, 4258, 4259, 4260, 4261, 4262, 4263, 4264, 4265, 4266, 4267, 4268, 4269, 4270, 4271, 4272, 4273, 4274, 4275, 4276, 4277, 4278, 4279, 4280, 4281, 4282, 4283, 4284, 4285, 4286, 4287, 4288, 4289, 4290, 4291, 4292, 4293, 4294, 4295, 4296, 4297, 4298, 4299, 4300, 4301, 4302, 4303, 4304, 4305, 4306, 4307, 4308, 4309, 4310, 4311, 4312, 4313, 4314, 4315, 4316, 4317, 4318, 4319, 4320, 4321, 4322, 4323, 4324, 4325, 4326, 4327, 4328, 4329, 4330, 4331, 4332, 4333, 4334, 4335, 4336, 4337, 4338, 4339, 4340, 4341, 4342, 4343, 4344, 4345, 4346, 4347, 4348, 4349, 4350, 4351, 4352, 4353, 4354, 4355, 4356, 4357, 4358, 4359, 4360, 4361, 4362, 4363, 4364, 4365, 4366, 4367, 4368, 4369, 4370, 4371, 4372, 4373, 4374, 4375, 4376, 4377, 4378, 4379, 4380, 4381, 4382, 4383, 4384, 4385, 4386, 4387, 4388, 4389, 4390, 4391, 4392, 4393, 4394, 4395, 4396, 4397, 4398, 4399, 4400, 4401, 4402, 4403, 4404, 4405, 4406, 4407, 4408, 4409, 4410, 4411, 4412, 4413, 4414, 4415, 4416, 4417, 4418, 4419, 4420, 4421, 4422, 4423, 4424, 4425, 4426, 4427, 4428, 4429, 4430, 4431, 4432, 4433, 4434, 4435, 4436, 4437, 4438, 4439, 4440, 4441, 4442, 4443, 4444, 4445, 4446, 4447, 4448, 4449, 4450, 4451, 4452, 4453, 4454, 4455, 4456, 4457, 4458, 4459, 4460, 4461, 4462, 4463, 4464, 4465, 4466, 4467, 4468, 4469, 4470, 4471, 4472, 4473, 4474, 4475, 4476, 4477, 4478, 4479, 4480, 4481, 4482, 4483, 4484, 4485, 4486, 4487, 4488, 4489, 4490, 4491, 4492, 4493, 4494, 4495, 4496, 4497, 4498, 4499, 4500, 4501, 4502, 4503, 4504, 4505, 4506, 4507, 4508, 4509, 4510, 4511, 4512, 4513, 4514, 4515, 4516, 4517, 4518, 4519, 4520, 4521, 4522, 4523, 4524, 4525, 4526, 4527, 4528, 4529, 4530, 4531, 4532, 4533, 4534, 4535, 4536, 4537, 4538, 4539, 4540, 4541, 4542, 4543, 4544, 4545, 4546, 4547, 4548, 4549, 4550, 4551, 4552, 4553, 4554, 4555, 4556, 4557, 4558, 4559, 4560, 4561, 4562, 4563, 4564, 4565, 4566, 4567, 4568, 4569, 4570, 4571, 4572, 4573, 4574, 4575, 4576, 4577, 4578, 4579, 4580, 4581, 4582, 4583, 4584, 4585, 4586, 4587, 4588, 4589, 4590, 4591, 4592, 4593, 4594, 4595, 4596, 4597, 4598, 4599, 4600, 4601, 4602, 4603, 4604, 4605, 4606, 4607, 4608, 4609, 4610, 4611, 4612, 4613, 4614, 4615, 4616, 4617, 4618, 4619, 4620, 4621, 4622, 4623, 4624, 4625, 4626, 4627, 4628, 4629, 4630, 4631, 4632, 4633, 4634, 4635, 4636, 4637, 4638, 4639, 4640, 4641, 4642, 4643, 4644, 4645, 4646, 4647, 4648, 4649, 4650, 4651, 4652, 4653, 4654, 4655, 4656, 4657, 4658, 4659, 4660, 4661, 4662, 4663, 4664, 4665, 4666, 4667, 4668, 4669, 4670, 4671, 4672, 4673, 4674, 4675, 4676, 4677, 4678, 4679, 4680, 4681, 4682, 4683, 4684, 4685, 4686, 4687, 4688, 4689, 4690, 4691, 4692, 4693, 4694, 4695, 4696, 4697, 4698, 4699, 4700, 4701, 4702, 4703, 4704, 4705, 4706, 4707, 4708, 4709, 4710, 4711, 4712, 4713, 4714, 4715, 4716, 4717, 4718, 4719, 4720, 4721, 4722, 4723, 4724, 4725, 4726, 4727, 4728, 4729, 4730, 4731, 4732, 4733, 4734, 4735, 4736, 4737, 4738, 4739, 4740, 4741, 4742, 4743, 4744, 4745, 4746, 4747, 4748, 4749, 4750, 4751, 4752, 4753, 4754, 4755,		
45. Circular Spring Balances, Small Dial, new list Nos. 4256, 4106, 4266, 4206, 4276, 4216, 4226, 4236, 4246, 4256, 4266, 4276, 4286, 4296, 4306, 4316, 4326, 4336, 4346, 4356, 4366, 4376, 4386, 4396, 4406, 4416, 4426, 4436, 4446, 4456, 4466, 4476, 4486, 4496, 4506, 4516, 4526, 4536, 4546, 4556, 4566, 4576, 4586, 4596, 4606, 4616, 4626, 4636, 4646, 4656, 4666, 4676, 4686, 4696, 4706, 4716, 4726, 4736, 4746, 4756, 4766, 4776, 4786, 4796, 4806, 4816, 4826, 4836, 4846, 4856, 4866, 4876, 4886, 4896, 4906, 4916, 4926, 4936, 4946, 4956, 4966, 4976, 4986, 4996, 5006, 5016, 5026, 5036, 5046, 5056, 5066, 5076, 5086, 5096, 5106, 5116, 5126, 5136, 5146, 5156, 5166, 5176, 5186, 5196, 5206, 5216, 5226, 5236, 5246, 5256, 5266, 5276, 5286, 5296, 5306, 5316, 5326, 5336, 5346, 5356, 5366, 5376, 5386, 5396, 5406, 5416, 5426, 5436, 5446, 5456, 5466, 5476, 5486, 5496, 5506, 5516, 5526, 5536, 5546, 5556, 5566, 5576, 5586, 5596, 5606, 5616, 5626, 5636, 5646, 5656, 5666, 5676, 5686, 5696, 5706, 5716, 5726, 5736, 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IMPORTS.

Of Hardware, Iron, Steel and Metals into the Port of New York, for the week ending July 27, 1880:

Hardware.	
Alexandre F. & Sons, Mach'y, pkgs., 4	Baldwin Bros. & Co., Gun barrels and fittings, cs., 3
Blumenthal A. & S., Case, 1	Boker Hermann & Co., Cases, 35
Casas, 8	Bryce Wm. & Co., Cases, 2
Buchanan & Lyell, Machinery, case, 1	Butler H. O., Machinery, cs., 4
Degrauw, Asmar & Co., Chains, 5	Drexel, Morgan & Co., Cases, 2
Ely & Wray, Cutlery, case, 1	Field Alfred & Co., For. caps, cs., 17
Fleetman & Co., Ironware, cs., 20	Folsom H. & D., Arms, cs., 15
Gunn, cs., 5	Friedmann & Lauterjung, Steelware, cs., 5
Galway & Casado, Iron rollers, 2	Gautier D. C., Wire plates, cs., 5
Godfrey Chas. J., Arms, cs., 6	Hammacher & Co., Wire, case, 1
Harmer, Hayes & Co., Case, 1	Hardley & Graham, Guns, cs., 15
Howard Bros. & Read, Case, 1	Jordan Henry, Iron wire, coils, 8
Lowenthal, Kaufmann & Co., Cases, 3	Maine Beef Sugar Co., Machinery, pkgs., 5
Mason John W. & Co., Wire rope, coils, 15	McCoy & Sanders, Mds., pkgs., 9
Merchants Dispatch Co., Gun wads, cs., 3	Moore's J. P. Sons, Guns, cs., 3
Moulson John, Cases, 6	Mount J. T., Cases, 4
Pacific Mail S. S. Co., Machinery, pcs., 3	Pratt & Whitney, Safety cartridges, box, 1
Rastor A., Cases, 3	Rogers H., Mds., pkgs., 2
Rosenthal J. & Co., Cases, 4	Schoverling, Daly & Gales, Gun wads, cs., 2
Schuyler & Duane, Cases, 2	Scott W. C., Cases, 6
Seligman J. & W. & Co., Galvan. wire, cs., 91	Singer Mfg. Co., Mds., pkgs., 3
Steiner Bros. & Patterson, Cases, 3	Struller, Lau & Co., Gun caps, cs., 24
Thornton John & Co., Cases, 5	Tierce & Fendleton, Machinery, cs., 2
Tillotson L. G. & Co., Telegraph wire, lots, 412	Tomet Francis, Case, 1
Ward Aaline, Cases, 15	Waterburg, Lawrence & Co., Machinery, cs., 12
Wetzlar M., Ironware, cs., 21	Wibbusch & Hilger Hdw. Co., Anvils, 312
Wilson D. H. & Co., Gun caps, cs., 2	Windmiller & Bolker, Arms, cs., 20
Wolf H. & Co., Cases, 1	Order, Bales, 7
Bicycles, case, 1	Bundles, 197
Cases, 2	Grindstones, 46
Machinery, case, 1	Machinery, cs., 9
Tools, case, 1	

Iron.

Alexandre F. & Sons, Plates, 25	Banks, 400
Banking of New York National Bank of Commerce, Oil barrel hoops, 10,994	Baring Bros. & Co., Bars, 323
Fig. tons, 14	Scrap, tons, 400
Becerra E. L. & Nephew & Co., Old iron, tons, 200	Berliner M., Old rails, pcs., 2726
Boynton Geo. A., Fig. tons, 500	

COAL.

Although the market during the past week has been comparatively quiet, there has been a considerable increase in the demand for Coal. The consequence is that dealers here are feeling considerably elated and are talking very hopefully of the future. At present they have a goodly number of orders, and some of them are shipping Coal as fast as they receive it. The manufacturing Coals are in the best demand. The domestic trade has as yet hardly begun. Buyers have held off unusually late, so that the manufacturing trade has hardly become fairly started at a date when the domestic trade is usually expected to be well under way. The result of this is that the domestic sizes are still quite dull, while the larger ones are brisk. For the future there is a little talk of an advance in some quarters. This is, however, not unnatural, especially as the reason for river shipping is growing so short.

The programme for August is to continue the present half-time work until the market appears to be in such a condition as to take all the Coal that can be mined. It is hoped by the combination that by the middle of August the demand will increase, so that full-time mining will be needed to supply the market. The supply of Lehigh Coal seems to be still behind the demand. Line trade on the larger sizes is brisk and takes nearly all that can be mined at the present time. While prices are nominally the same as they have been, it appears that circular rates are more nearly obtained now than they were a short time since. On some sizes of Lehigh there are no discounts to be obtained. Lump Lehigh is quoted at from \$5 to \$5.25, Grate, Egg and Stove \$4.25, Chestnut \$4. Free-burning Coals are quoted: Lump, Grate, Egg and Chestnut, \$4; with Stove at \$4.25.

OLD METALS, PAPER STOCK, &c.

There are no new features to note in these markets since our last writing. The demand continues good, and quotations stand unaltered.

The purchasing prices offered by dealers for Old Metals are as follows:

Copper, heavy	10.16
Copper Bottoms	10.16
Yellow Metal	10.16
Brass, heavy	10.16
Composition, heavy	10.16
Lead, heavy	10.16
Tea Lead	10.16
Zinc	10.16
Pewter, No. 1	10.16
Wrought Iron	10.16
Light do.	10.16
Stove Plate	10.16
Machinery do.	10.16
Grate Bars	10.16

The prices current for Rags, &c., are as follows:

Canvas, Linen	10.16
White Cotton, New	10.16
No. 1	10.16
No. 2	10.16
Second	10.16
Soft Woollens	10.16
Mixed Rags	10.16
Gunny Bagging	10.16
Julie Butte	10.16
Kentucky Bagging	10.16
Book Stock	10.16
Newspapers	10.16
Waste Paper and Scrap	10.16
Kentucky Bale Rope	10.16

PHILADELPHIA.

Office of The Iron Age, 220 South Fourth St., Philadelphia, July 27, 1880.

Pig Iron.—The market shows further improvement, and nearly all descriptions are dearer to buy. The advance has been so gradual, and the change in quotations so slight, as to be almost imperceptible, but comparing prices to-day with those current a month ago, a gain of about \$2 per ton may be noted. Values are also definitely established, and holders can calculate, with some degree of certainty, what their stocks are worth. The reaction, although not unlooked for, presents some very contradictory features. For instance, the market was said to be overloaded with stocks to such an extent as was never known before. Vast quantities of foreign iron were asserted to be in store, on wharves and arriving daily, and to a certain extent, this statement was correct. Not more than a month ago immense piles of iron were said to be on furnace banks, and sellers were almost begging for bids. This aspect of the trade has entirely changed, and the scarcity of good Irons now seems to be in about the same proportion as the excess was not more than five or six weeks ago. It puzzles the trade to know what has become of the Iron, and what has made so great a change. This cannot be answered in an entirely satisfactory manner, for it is certain the market did seem immensely overloaded, while to-day there appears to be an absolute scarcity. The general opinion seems to be that stocks are not so large as was estimated, and that the quality of foreign iron is so uncertain as to practically rule it out of competition with American Iron. This does not fully meet the case, however, as there is some good Iron, and good or bad, it will all eventually go into consumption. The correct solution may be that the previous advance of \$25 per ton (commencing at \$18 and ending at \$43) was the extreme in one direction, and the subsequent decline of \$20 was the opposite, and the present movement a natural and legitimate reaction to a fair basis of values. Still, the problem is a most difficult one to solve, and the future of the market is very uncertain. At this time the tendency is undoubtedly toward higher prices, and there are many circumstances favorable to a further advance. The strongest feature (as we said during the decline) is in the enormous consumption. This has not only been maintained, but is steadily increasing, and will probably be larger this fall than in the exceptionally prosperous fall of 1879. The steady advance in prices and the favorable advices from England tend to strengthen the market here also, and if the upward movement is maintained abroad, prices here may be expected to sympathize. Still it will do no harm to keep a sharp lookout for sales of foreign Iron. The American market proved a very convenient one on the last rise, and if prices get much higher, some heavy loads will probably be shifted in this direction again. In point of fact, English ironmasters are figuring for sales of large lots now, and at an advance of an extra dollar or two, shipments this way will probably be resumed. Locally, there is an excellent demand, and as the mills will all start up again in course of the week, sales of Forge have been unusually heavy. In fact, all grades of Iron are in active request, and sales are reported as follows: No. 1 Foundry, \$24.50 @ \$26; No. 2 Foundry, \$22.50 @ \$23.50; Gray Forge, \$20.50 @ \$21.50; Scotch Iron—Eglington, \$20 @ \$22; Gartsherrie, \$23 @ \$24.50; English Iron—Sales of 1000 tons, in bond, at \$9; Charcoal Iron—Warm-blast, \$32 @ \$35; Cold-blast, \$38 @ \$40. Market strong.

Muck Bar.—The demand during the week has been at prices below the views of holders of good stock. Sales have been made at \$36 @ \$38, at mill, but \$40 in Philadelphia may be regarded as an inside price, with \$41 generally quoted for Refined Bars.

Blooms.—The market is firmer, but the demand is only moderately active. We con-

tinue last week's quotations, although about \$2.50 per ton more is generally asked, without resulting in business. Cold-blast Charcoal Blooms are quoted at \$67.50 @ \$70 per ton of 2464 lbs.; Run out Anthracite, \$55; Sunken Scrap Blooms, \$50 per ton of 2240 lbs.; and Northern Ore Blooms, \$45.

Structural Iron.—Business continues good, and numerous orders have been placed at steadily improving prices. The mills are now so fully supplied with orders that new business cannot be placed, unless at very full figures, and a further advance is not improbable. Meantime Angles are quoted 2.75; Beams, 3.5; Channels and Tees, 3.25.

Plate and Tank Iron.—Prices are very firm, and it is exceedingly difficult to place orders for early delivery. No business of importance has been done during the week, owing to the fact that manufacturers are full, and cannot accept orders except for small lots. We make no change in quotations, but prices are firm, and likely to be somewhat higher: Tank Iron, 2.84; C. No. 1, 2.99; C. H. No. 1, 3.25; Flange Iron, 5.9; Fire-Box, 5.44 @ 6.6.

Sheet Iron.—The demand has been very heavy during the week, and inquiries for large lots are still coming in, indicating considerable business near at hand. Manufacturers begin to feel that they have nearly as much as they can attend to, and are in no way anxious for further orders at present. Prices, therefore, are firm, and may be quoted for small lots as follows:

Common Sheet, No. 26 to 28	4.50
Common Sheet, No. 22 to 25	4.50
Common Sheet, No. 16 to 21	4.50
Best Reduced 1/4 @ 1/4 advance on the above	3.35
Best Bloom Sheet, No. 26 to 28	7.50
Best Bloom Sheet, No. 22 to 25	7.50
Common Red Plates, 3-16 to 16	3.35
Blue Annealed, 3-16 to 16	3.35
Best Bloom Galvanized, discount	25
Second quality, discount	35

Bar Iron.—The market is unsettled and prices somewhat irregular, owing to the resumption of work at the mills. The price fixed as a basis for labor during the coming month is 2.45, but it would be difficult to find buyers at the price, in quantity sufficient to give full employment for that period. In fact, we hear of sellers at 2.35, and only a moderate demand at that figure. The advance to 2.55 from store, mentioned in our last, is nominally maintained, but until the mills get fairly to work, it will be impossible to make much headway at that price. The steady consumption of finished iron, and the advancing tendency in the cost of material will, no doubt, lead to higher prices in the near future, and the present irregularity, for the reason given, is likely to be only temporary. As to the settlement of the labor question, the schedule agreed upon recognizes the fact that while the selling price of Bar Iron is 2.4-10¢ per pound, as determined upon by the mill owners as a basis of wages, it may possibly go below as well as beyond that figure, and that they must share in the proportionate decline as well as in the proportionate advance. Thus, when the puddlers asked \$4.50 per ton on the basis of 2.5-10¢ per pound, the employers resisted, as Iron was at that time selling at 2.3-10¢ per pound, or equivalent to \$4.15 per ton, with 15¢ added by the office, but now that it has reached 2.4-10¢, differences have been harmonized by the following scale, which gives \$4.25 per ton for puddling, with the 15¢ paid by the office, making the total price per ton of \$4.40, a concession by both sides of 10¢ per ton:

When Iron is	Price puddling	Ad. by office	Total pd.
2.5 per lb.	\$3.85	15	\$4.00
2.4-10	3.95	15	4.10
2.3-10	4.05	15	4.20
2.2-10	4.15	15	4.30
2.1-10	4.25	15	4.40
2.0-10	4.35	15	4.50
1.9-10	4.45	15	4.60
1.8-10	4.55	15	4.70
1.7-10	4.65	15	4.80
1.6-10	4.75	15	4.90
1.5-10	4.85	15	5.00
1.4-10	4.95	15	5.10
1.3-10	5.05	15	5.20
1.2-10	5.15	15	5.30
1.1-10	5.25	15	5.40
1.0-10	5.35	15	5.50
0.9-10	5.45	15	5.60
0.8-10	5.55	15	5.70
0.7-10	5.65	15	5.80
0.6-10	5.75	15	5.90
0.5-10	5.85	15	6.00
0.4-10	5.95	15	6.10
0.3-10	6.05	15	6.20
0.2-10	6.15	15	6.30
0.1-10	6.25	15	6.40
0.0-10	6.35	15	6.50

When the price of iron is less than 2¢ per pound, the lowest on the scale, the price of puddling is to scale 10¢ less for each 1-10¢ per pound reduction, and when the price is more than 5.1-10¢ per pound, the rate for puddling is to scale 35¢ for each 2-10¢ advance. All mill hands are to be paid in the same proportion, based on the schedule of wages adopted September 2, 1878. The mill owners are to fix the selling price for bar iron on the third Monday of each month, to take effect on the first Monday of the following month, and publish the fact in The Iron Age, and said price will indicate the basis to govern the above scale of wages for one month, irrespective of any change in the price of iron during that time. The agreement above adopted is looked upon by both sides as a fair and equitable adjustment, and it is believed that under it there need be, hereafter, no occasion for strikes or difficulties of any sort. In reference to the advance of one tenth in the selling price of bar iron, it was stated by one firm that the increase was partly due to the stoppage of production by the strike while the consumption still went on, and partly to a temporary cessation in Pittsburgh and other places. A member of another firm said that the strike did not affect them injuriously in any way, but, on the contrary, gave them an opportunity to dispose of some of their surplus product. Of the \$4.25 paid for puddling, the helper gets one third, or \$1.41, with 15¢ added by the firm, making his wages about \$1.56 per ton, and leaving the remainder of the \$4.25, or \$2.84, as the wages of the puddler. It is said that these two men can handle more than a ton, or about 2500 pounds of iron per day, thus increasing the wages of each somewhat above these figures.

Steel Rails.—There is no change of importance; the market continues active, and prices are firm. Sales of small lots during the week have been made at \$62.50 @ \$65 for 1880, according to delivery, and about \$60 for 1881. Orders are not difficult to obtain, but manufacturers have consider-

able work on hand, and unless at full prices, are not accepting new business. An order for Streets was placed during the week at \$71 at mill.

Iron Rails.—The market is again firmer and the demand very active. Prices are somewhat irregular, and orders are said to have been placed at \$44 @ \$45, but we have no definite knowledge of any recent sales below \$46 at mill. Some of the larger concerns are asking still higher prices; but at this date heavy sections can probably be bought at \$45 @ \$46, although the feeling is much stronger than it was two or three weeks ago. The mills are pretty full of work, and as there is but little competition from abroad at current rates, a steady and improving market is anticipated. Sales of about 5000 tons, heavy sections, are reported at \$46 at mill, and \$46.50 @ \$47 is generally asked.

Old Rails.—The market shows no change, and buyers and sellers appear to be as far apart as ever. Sales of a few small lots have been made during the week at \$25, and that figure is now bid for round lots, without inducing sales. The demand is not specially urgent, and at over \$25 business is very much restricted. Holders ask \$26 @ \$27, and show no disposition to make concessions.

Fish Plates.—Are quoted 2.35 @ 2.45; Track Bolts, 3.55 @ 3.75; Spikes, 2.45.

Scrap Iron.—Prices are again higher, and selected lots of No. 1 Wrought command \$25 @ \$26.50; Medium, \$23.50 @ \$24.50, and Machinery Cast, \$18 @ \$20.

Nails.—The market is steady at \$3.10, less the usual trade discount.

PITTSBURGH.

(By Telegraph.)

PITTSBURGH, PA., July 28, 1880.

At a full meeting of the Western Nail Manufacturers' Association, held in this city to-day, the members agreed to sell Nails at \$3 to-day, with the usual quantity and cash discounts. The card, however, remains unchanged. This is an advance of 25 cents a keg over selling prices.

Office of The Iron Age, 77 Fourth Avenue, Pittsburgh, Pa., July 27, 1880.

Pig Iron.—The market has been less active the past week, although there was a very fair business. Nevertheless, sales of between 5000 and 6000 tons having been reported, and prices are fully sustained with a tendency to go still higher. Forge Irons may be quoted as follows: Bituminous Coal Smelted Lake Ore—\$22.50 @ \$23.50 for Neutral, \$24 @ \$25 for Red-short, cinder mixture, and \$27 @ \$28 for all ore do. Bessemer, \$26 @ \$30; Foundry Grades, \$25 @ \$28—as to quality. Sales of 1000 tons of Forge, inclined to Red-short, at \$24, 4 mos.; 5000 do., \$25; 400 tons Neutral, \$23; 600 tons Bessemer, 26.50. Coke Iron from native ore is selling at \$22 @ \$22.50, 4 mos., for Forge, and \$23.50 @ \$24 for Foundry. Of Anthracite there have been sales during the week at \$21.25 for Close Gray Forge, \$22.50 for Close and Mottled, \$23 for Neutral and \$24 @ \$25 for Red-short. Foundry went from \$26 to \$28. While producers would like to get prices up still higher, the result of the last "boom" continues fresh in their memories, and whenever values reach a point that importations can be started up again, a halt will be called. There is a desire, both on the part of producers and consumers, to keep foreign Pig Iron from coming into the country, and the only way to accomplish this is to prevent the price of the home product from getting up too high. At the prices quoted the margin for profit is small, for notwithstanding they are considerably higher than at this time last year, it is well to bear in mind that the cost of production is much greater. However, the feeling is better and there is no question but the situation is more encouraging than it has been for some time past.

Manufactured Iron.—There is an increasing demand, although the ending of the lockout at Philadelphia will no doubt curtail orders from that direction, except for some kinds which are not made at Philadelphia. Prices are firmer. There are few sellers now under a 2 1/2¢ base, but large orders for prompt delivery can still be placed at from 2¢ @ 2 1/2¢ rates, spot cash. Sales of Plate Iron have been made during the past week at 2.60¢ @ 2.70¢, and Sheet Iron, for which the demand has been unusually active during the past few weeks, may be quoted on a basis of 3.70¢ @ 3.80¢ for No. 24. Skelp Iron is selling at about the same price of Bars, with an increased demand. Manufacturers generally are averse to making contracts for future delivery, and, moreover, they are discouraging speculation; they have not forgotten that the bad effects of the last boom was caused largely by speculators, and then the fact is still fresh in their minds that some of the so-called speculators, after the collapse, for various pretexts, among others that the Iron did not come up to sample or the delivery was not made according to specification, &c., went back on their contracts. Moreover, in case of a reaction, speculators are always first to cut prices; with some of them it is a matter of necessity, and there is not much chance for the manufacturer until the speculative lots have all been disposed of. This being the case, it is not strange that manufacturers are discouraging speculation, and speculators here in Pittsburgh cannot buy on the same equality with jobbers and consumers.

Nails.—There has been no material change in the situation since our last report; while the demand is better, it is not what it should be at this season, but there is reason to look for at least an average fall trade. There are those who are confident of more than an average business during the time in question. While the card remains unchanged at \$3.25, the actual selling price, both here and in Wheeling, is \$2.85, 60 days, with the usual abatement of 10¢ per keg on car-load lots, with 2 per cent. off for cash. But few, if any, of the factories here are working up to their full capacity. A special meeting of the Western Nail Association will convene here to-morrow.

Wrought Iron Pipe.—There is an increasing demand for Gas and Steam Pipe, but prices are no better, although there is a firmer feeling, in sympathy with Iron. We continue to quote discounts at 65 @ 70 per cent.; Boiler Tubes, 45 @ 50 off; Oil Well Casing, 70¢ per foot, net; do. Tubing, 20¢, net.

Railway Supplies.—There is still considerable inquiry for Steel Rails for early deliveries, but as the mills have contracts sufficient to absorb their production for several months to come, they are unable to sell, except for delivery late in the fall, and buyers are not disposed to buy so far ahead. Railway Spikes are reported steady at 2 1/4¢, 30 days. Track Bolts, 4¢ @ 4 1/2¢, according to nut; Fish Plates, 2.25¢ @ 2.35¢.

Scrap.—There is a much firmer feeling for all kinds of Scrap, in sympathy with the advices from the East, and more inquiry, but it is difficult to give quotations, as no two dealers give the same figures. No. 1 Wrought is ranging somewhere from \$25 @ \$27 per net ton; Old Car Axles and Car Springs, \$33 @ \$35, net; Old Car Wheels, \$32 @ \$35, gross.

White Lead.—Has been reduced half a cent, in sympathy with Linseed Oil, which has declined about 20¢ per gallon within a few weeks.

Coke.—The activity noted in our last report still continues, and prices are firm, but unchanged. Connellsville, \$1.50 per ton, delivered free on cars at ovens. Small foundry orders, \$1.75. The demand appears to be sufficient to absorb the production, which is large, and makers generally are fully confident that prices will be maintained, and that if there is any change it will be upward. Large shipments are being made eastward.

Business in general continues to wear the cheerful aspect reported last week. There is steady and reliable improvement in the volume of trade and in prices of all manufactured products. We keep prices down to the last figures, though small lots of almost every article quoted have sold at slightly more. There is a general impression in this district that the disposition to inaugurate a speculative boom ought not to be encouraged. Producers are of opinion that they will make more money and not have to labor so hard if business remains fair, strong and steady, than they will if things go with a rush that must at last be compensated for by a dead calm. The weather has been decidedly cool for this climate during the week, the average maximum thermometer being about 84 degrees, with nights reminding one of October. There is no further news of yellow fever at New Orleans, except that the health authorities there are very confident that the disease will not spread. A few more days will decide that question, and until then commercial calculations on the matter are of no value.

Pig Iron.—The market is strong. Holders are firm, but not disposed to push prices up very rapidly. They report a very steady market, with inquiries for large lots arriving in satisfactory numbers and from first-rate parties. We continue last week's figures: No. 1 Foundry, \$24 @ \$26; No. 2 Foundry, \$22 @ \$24; Gray Forge, \$18 @ \$20; White and Mottled, \$15 @ \$17; Car Wheel Metal, \$40 @ \$45.

Muck Bar, &c.—No Muck Bar in market. Scraps are in light supply and stronger. We quote Wrought at \$20 @ \$24, an advance of about \$4. Cast is worth \$12 @ \$15, according to quality. Old Rails are strong at \$25; Old Wheels, \$26 @ \$28.

Ores.—Are strong as Iron advances, but there has been no intimation of an advance. We quote: 50¢ Brown Hematite, per ton, \$2 @ \$2.75; Red Fossil, \$2 @ \$2.25.

Nails.—Are fairly steady at \$3.25 rates.

Manufactured Iron.—Bar is strong at quotations, with prospects of a substantial advance. Purchasers no longer range themselves uniformly on the bull side of the market, but buy at the rates offered by mills and dealers. All other articles in the list are strong and trade in them is quite satisfactory. We quote Bar at \$2.35 rate; Railroad Spikes, \$3; Track Bolts, \$4; Trestle Bolts, \$4.50; Fish Plate, \$2.50.

Coal.—Is unchanged at \$1.65 @ \$1.75 for run of mine, delivered at mills; Lump, 10¢ @ 12¢ per bushel, delivered.

Coke.—We quote at \$3 per ton at furnace; Foundry Coke, 10¢ @ 12¢ per bushel.

Steel and Iron Rails.—Railroad Bars maintain the strong market reported last week, this being especially the case with Iron Bars. The mills here and at Atlanta are full of work and prices are a decided shade better. The last lot reported was placed at about \$46, net. We quote Steel at \$60.

Lead.—Inquiry for Lead in pigs and bars improves slowly, and when the superior quality of the output of Tennessee mines and furnaces comes to be known, trade in this important article must improve. We quote: Pig Lead, 4 1/2¢ @ 4 3/4¢; Bar Lead, 5 1/2¢ @ 5 3/4¢.

BOSTON.

JULY 24.—The improvement reported last week has been fully sustained, and the market is now strong and cheerful at current rates. There is but little present tendency to unduly advance rates, however, and it is remembered that the present improvement is due to the decrease of domestic production and of foreign importations. Any material advance would speedily do away with those two restrictive influences, and inflict the burden of another surplus of Pig Iron upon all of our markets. For American Pig Iron we quote \$25 @ \$27 for No. 1 X, \$22 @ \$24 for No. 2 X and \$20 @ \$21 for Gray Forge. These prices are f. o. b. at the shipping port. Freight from New York are \$1.15. Foreign Iron continues to be cabled firm abroad. Sales are being made here at \$22.50 @ \$23 for Eglington, \$23 @ \$24 for Glengarnock and Gartsherrie, \$23 @ \$21 for English Foundry Iron and \$26 for Langlois. Sales of 10 to 50-ton lots are made at the outside figures and larger lots at the inside price. Old Rails have stiffened up to the

Missouri... Southern... Hanging Rock... Messrs. Iron Ore... as follows... demand have maintained... day:

Missouri... Southern... Hanging Rock... Messrs. Iron Ore... as follows... demand have maintained... day:

Missouri... Southern... Hanging Rock... Messrs. Iron Ore... as follows... demand have maintained... day:

Missouri... Southern... Hanging Rock... Messrs. Iron Ore... as follows... demand have maintained... day:

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Missouri... Southern... Hanging Rock... Messrs. Iron Ore... as follows... demand have maintained... day:

Missouri... Southern... Hanging Rock... Messrs. Iron Ore... as follows... demand have maintained... day:

Missouri... Southern... Hanging Rock... Messrs. Iron Ore... as follows... demand have maintained... day:

Missouri... Southern

views of holders noted last week. Among other sales has been one of 500 tons American at \$30, and \$29 is reported to have been refused for 2500 tons. Manufactured Iron has also improved in tone, and we quote Bar at \$2.25 @ \$2.40. Plate Iron has been advanced to \$3 for Tank; \$3.20 @ \$3.25 for C. No. 1; \$3.62½ for C. H. No. 1 Shell and \$4.62½ for C. H. No. 1 Flange. The Boston store prices of Norway Bars are 4½¢, and Shapes, 5½¢. The Boston store prices of Sheet Iron are as follows: Common at 3¼¢ for No. 16, and 4¼¢ for No. 20; 21 to 24; Refined at 5¼¢ for No. 24 and 6¢ for Nos. 25, 26 and 27; Galvanized at 9¢ for No. 20, and 9½¢ for Nos. 21 to 24, and 10½¢ for No. 26; Russia at 14¢ for No. 10, and 13¢ for Nos. 11 to 13. Copper is still dull, and the market closes nominal at 18½¢ for 18½¢ for Lake. Lake is being jobbed here at 19¢, and English Best Selected is being sold out of store at 18½¢ for 18½¢. There has been no change in the combination prices of Manufactured Copper. We quote New Sheathing Copper, 26¢; Braziers, 28¢; and Bolts, 28¢; Bottoms, 31¢; American Yellow Sheathing Metal, 17¢ @ 18¢; Yellow Metal Bolts, 20¢; and English Yellow Metal, 14¢ in bond. Tin is still buoyant, and under the influence of an advance of nearly £7½ ton for Straits in London since our last, has sold up to 21¢ @ 21½¢ for 1½ for large parcels in this market. The outside figure has been obtained for lots for July shipment from Singapore, and their purchase indicates a marked degree of confidence on the part of operators. Spelter is without material change, and we continue to quote 5½¢ for car-load lots of Western, and 5½¢ @ 5½¢ for store lots. Antimony sells from store at 17¢ @ 18¢ lb. Lead continues easy, and the nominal price of car-load lots is \$4.50 @ \$4.60. Store lots command 5¢ @ 5½¢.—Commercial Bulletin.

CINCINNATI.

Messrs. E. L. HARPER & Co., under date of July 26, write us as follows: The market continues to grow steadily stronger day by day. But few of the furnaces have iron to spare for early delivery, and those who have appear reluctant to sell to any extent. The fact is that the large demand which has lately prevailed has prominently brought into notice the exceedingly short stocks in the West and South. Consumption continues very large, with every indication that any change will be an increase.

FOUNDRY IRON.

No. 1 Hanging Rock Charcoal.....\$30.00 @ \$31.00
No. 1 Southern.....27.00 @ 28.00
No. 1 Strong Coke.....27.00 @ 28.00
No. 1 Soft Stonecoal.....23.50 @ 24.50
No. 1 Open Silver Gray.....23.00 @ 24.00

GRAY IRON.

Hanging Rock Charcoal.....\$25.00 @ 26.00
Neutral Coke.....24.00 @ 25.00
Cold-Short.....22.00 @ 23.00

CAR WHEEL—MALLEABLE.

Hanging Rock, Cold-blast.....46.00 @ 47.00
Southern, Warm-blast.....41.00 @ 42.00
Lake Superior.....40.00 @ 41.00

LOUISVILLE.

Messrs. GEO. H. HULL & Co., under date of July 23, write us as follows: There has been an active demand for Iron during the last week, and prices of Hot-blast Iron have advanced fully \$2 per ton. Nearly all the Southern furnaces are sold ahead and decline to book further orders at present. We revise quotations, which we base on actual sales for cash, as follows:

FOUNDRY IRON.

No. 1 Hanging Rock, Charcoal.....\$28.00 @ 29.00
No. 2.....26.00 @ 27.00
No. 1 Southern, Charcoal.....26.00 @ 27.00
No. 2.....24.00 @ 25.00
No. 1 Hanging Rock, Stonecoal and Coke.....25.00 @ 26.00
No. 2 Hanging Rock, Stonecoal and Coke.....24.00 @ 25.00
No. 1 Southern, Stonecoal and Coke.....25.00 @ 26.00
No. 2.....24.00 @ 25.00
"American Scotch".....25.00 @ 26.00
Silver Gray.....22.00 @ 23.00
Scotch.....23.00 @ 24.00

MILL IRON.

No. 1 Charcoal, Cold-short and Neut'l.....23.00 @ 24.00
No. 1 Stonecoal and Coke, Cold-short and Neut'l.....22.00 @ 23.00
No. 2 Stonecoal and Coke, Cold-short and Neut'l.....21.00 @ 22.00
No. 1 Missouri and Indiana Red-short.....27.00 @ 28.00
White and Mottled, Cold-short and Neut'l.....20.00 @ 21.00

CAR WHEEL AND MALLEABLE IRON.

Hanging Rock, Cold-blast.....45.00 @ 46.00
Alabama and Georgia, Cold-blast.....43.00 @ 44.00
Kentucky, Cold-blast.....40.00 @ 41.00

W. B. BELKNAP & Co., Iron and Steel merchants, Nos. 113 and 115 West Main street, report to us as follows, under date of July 23: Firmness and activity continue the marked features of the Iron market. The volume of trade for the week closing to-day has been larger than any of its predecessors for several months back. As compared with the same period last year, the condition of trade at the present time is much more satisfactory. Crop reports from the South and Southwest are very favorable, and the indications are that the fall trade will be unusually large. Bar Iron continues in active demand, and large orders are readily obtained at 2.30¢ card. Mill men in this immediate locality claim that 2.30¢ is absurdly low, taking into account the increased cost of raw material and labor. Sheet and Hoop Iron are still in good demand and prices are moving up steadily. Nos. 26 and 27 Boiler Iron find ready sale at 4.10¢ @ 4.20¢ respectively, and Hoop Iron at 1¼¢ @ 2¢ and 3½¢ lb. Cut Nails are enjoying a booming trade, though prices are unsteady. It is surprising that this should be so, in view of the "fatigued" condition of stocks, together with an extraordinary demand—which, by the way, is not the least bit speculative. Horse Shoes, Horse Nails, Steel, &c., are receiving their share of attention from buyers, and prices are firm, but quotably unchanged.

ST. LOUIS.

Messrs. CARD & HOFFER, Pig Iron and Iron Ore Merchants, 417 Pine street, write us as follows, under date of July 24: The demand has continued very fair and prices have maintained themselves. We quote to-day:

HOT BLAST CHARCOAL.

Missouri.....\$27.00 @ 28.00
Southern.....24.00 @ 25.00
Hanging Rock.....28.00 @ 30.00

COKE AND COAL.

Missouri.....None offering
Southern.....24.00 @ 25.00
Ohio.....24.00 @ 25.00

MILL IRON.	
Cold-short.....	20.00 @ 23.00
Red-short.....	24.00 @ 25.00
CAR WHEEL IRON.	
Missouri.....	38.00 @ 40.00
Southern.....	40.00 @ 41.00
Ohio.....	36.00 @ 45.00
IRON ORE.—NOMINAL.	
Ore for fix.....	10.00 @ 12.50
For furnace.....	6.50 @ 7.50
Brown Hematite.....	no market.

RICHMOND.

Mr. ASA SNYDER, Iron Merchant and Furnace Agent, writes as follows under date of July 26: Prices continue to advance. If holders are satisfied with a gradual improvement, the fall business will be very encouraging. Quotations are as follows:

Scotch Pig Iron, according to brand.....	24.50 @ 28.00
Am. Scotch Pig Iron.....	20.50 @ 30.50
American No. 1.....	25.50 @ 35.50
No. 2.....	21.50 @ 31.50
Am. Mot. and White.....	21.50 @ 31.50
Cold-blast Charcoal.....	42.00 @ 46.00
Old Rails.....	32.00 @ 34.00
Wrought Scrap Iron.....	22.00 @ 23.00
Cast Machinery, No. 1.....	20.00 @ 21.00
Richmond Refined Bar Iron, Stand'd.....	2.6 @ 3.00
Horse Shoes, Treadgear.....	4 @ 5.00
Mule.....	4 @ 5.00
Old Dominion Nails, (standard size).....	3.00
For lots of 200 kegs, 10¢ per keg less.	

Our English Letter.

Review of the British Iron, Steel, Metal and Hardware Trades.

(From our Regular Correspondent.)

LONDON, ENG., July 12, 1880.

THE IRON MARKETS

of this country have been very firm since the date of my last letter, and at the time of writing everything points to a new period of activity. As I stated last week, it is scarcely possible to recount how or why the alteration has come about, but that there has been a marked improvement all reports go to show, with the record of many points which give every hope for the immediate future. Glasgow has again led the way toward the new departure, and has emphasized its pioneering in a somewhat remarkable manner during the past week, the rises of one day alone having reached 2/ per ton on warrants. The very favorable nature of the official Board of Trade returns for the month of June had something to do with this, many outside speculators having received the impression that the iron trade is really much better than it has been reported to be by those engaged therein. With this idea the dabbles have once more rushed in, and will, in all probability, again burn their fingers. Makers' iron has also been advanced by the cautious Scotch smelters and merchants, who rarely fail to take the full advantage of a rising warrant market, however much they may disregard movements of the contrary description. It is not in Scotland alone that the tone of iron markets is better. On the contrary, there is scarcely a single iron district which does not furnish reports speaking with singular unanimity of stronger inquiries, more numerous sales, fuller employment at the works and furnaces and higher prices. This feeling is doubtless strengthened by the analysis of the Board of Trade returns, which show that although exports to the United States have fallen off to a considerable extent, yet that there has been an expansion in other directions which compensate for the defection in your market, or at all events within a very slight percentage. It is, therefore, argued that if such is the case at a time when your market is relatively demoralized and weak, a much greater amount of activity must needs prevail before long, especially as our latest cable advices speak of your full trade and its probabilities in exceedingly hopeful terms. It is little, if anything, more than a year since the great American boom first reared its head and touched our metallurgical industries with its magic wand. In the 12 months much has happened; indeed, on both sides of the Atlantic the iron trade has passed through almost every shade of hope and fear, delirium and doubt, prosperity and adversity, that could by any possibility be crowded into so limited a period. Persons here are now beginning to ask themselves whether we are on the eve of another boom, and are (perhaps with somewhat superfluous virtue and Falstaffian courage) making all sorts of resolutions to do nothing which might tend to land the trade in a new slough of despond. They will not speculate one iota—so these worthy gentlemen assure us—will be particularly careful not to overbuy, and will strictly limit their transactions generally. Alas! for the weakness of human nature. Several of these gentlemen are positively known to be buying forward in the most determined manner, and are, indirectly, getting hold of as much iron of certain kinds as they can secure without attracting attention! They are not to be blamed for taking this course—if it commands itself to their minds and pockets—but we may at least humbly request that they will not protest quite so much. What we all depend on more than anything else is the harvest, which is now high at hand. In many parts of Great Britain there have been heavy and numerous thunder and rain storms during the past few weeks. In some instances these storms have been unusually violent, and have done much damage to the standing crops. The area thus damaged has not, I think, been large, comparatively speaking; but the weather generally has become so broken as to slightly dash the ultra-optimistic hopes which had been entertained as to the probable results of the harvest. At the same time, I am pretty safe in stating the opinion that the crops will be much above the best of those in any given year recently, and possibly will yield a full average all round. If that expectation should be realized, we should not need to buy so much grain from you as we had occasion to do last autumn, but would keep our money at home for the benefit of our own farmers and trades. On the Continent the wheat crop will be fairly good in quality, but in Western Europe rather deficient in quantity.

THE QUARTERLY MEETINGS

of ironmasters and their customers have

been held since I last reported, and were gatherings of more than ordinary importance. There are a number of these meetings at the commencement of each quarter of the year, but the only three which are of importance are those at Middlesbrough, Wolverhampton and Birmingham. The first named is simply an enlarged sort of weekly 'change, and the Wolverhampton meeting is being attenuated into something of the kind, although it occasionally results in fixing a standard of prices for the meeting of the next day at Birmingham. To take the gatherings in the order of their occurrence, I must begin with that at Middlesbrough, which took place on Tuesday, July 6, and was pretty well attended by the Northern smelters and others. There was a fair amount of business transacted, and it was generally held that the trade had at length got round the corner, with every prospect of more work being put in hand and better prices realized within the next few weeks. The finished iron works and the foundries were stated to be well engaged, and the blast furnaces running on full time without adding materially to reserve stocks. In Connal's Middlesbrough stores the reserve was shown to be about 90,000 tons. Under these conditions there was every disposition on the part of those present to take sanguine views of the situation, which feeling led to several advances of prices among the furnace owners. The two meetings in the Midlands were so close together in point of situation and dates, that comment on, or a report of, one may be accepted in respect of either, with the proviso that most of the business was actually concluded at Birmingham. The firmness of crude irons was most noticeable, especially in the face of the recent dullness of almost all varieties of furnace products. Ordinary cinder pigs fetched £2. 2/6; part mine, £2. 10/ @ £3; all mine, £3. 5/ @ £3. 15/; hot blast, £3. 10/ @ £3. 15/; cold blast, £3. 15/ @ £4. 5/; hematites, £3. 15/ @ £3. 17/6. Several thousand tons of Northamptonshire (oolitic) pigs, for admixture with other sorts, were sold at 5/ @ 7/6 advance over recent figures. Hematites also sold very freely, some of the producers being reported to have contracted for their entire output for 1880. In finished iron there was a fairly good business, vendors being stiff in their prices and disposed to be stringent as to terms of payments. They were also shy on the subject of booking themselves for forward deliveries, under the impression that there may be a notable jump before long—of which they not unnaturally desire to take passing advantage. Inquiries were reported to be rather numerous for hoops, strips and other iron for the United States, and it was stated that several such inquiries had resulted in sales, but I am not in a position to corroborate the statement to the latter effect. Best marked bars were unchanged on the list basis of £3, medium sorts selling at £7, and common at below £6; sheets (single) at £7; doubles, £8 @ £9; hoops, £7 @ £8; gas strip, £5. 15/ @ £6. 5/; "Sovereign" sheets, £13; "Woodford" black sheets, £8; galvanized corrugated sheets, £13. 10/ @ £15. 10/. Many buyers were present from London, Liverpool, the Continent, and several American houses were represented, directly or indirectly.

SCOTCH PIG IRON

has been strong throughout the week, with a good deal of speculative "ballooning," many transactions both in paper and iron, and repeated rises in quotations. The "bear" account, which is still in suspense, has been assisted by the Board of Trade returns; so that these two and certain collateral causes have conspired to favor the hopes of those who are "in" for a rise. Shipments are pretty good, and continue to compare well with the same period of 1879. In Connal's stores there are 148,585 tons—an increase of 391 tons on the week, and of about 33,000 tons since Christmas last. This date last year the quantity stored was 279,652 tons. Another furnace has been blown in, making 117 now in blast in Scotland, against 90 a year ago. Ballast pig iron is quoted 47/6 in John E. Swan & Bros.' Glasgow Prices Current of July 9. The imports of Middlesbrough pig into Scotland are still on a low scale, a circumstance which assists the Scotch ironmasters in maintaining their own prices. Writing from Glasgow on July 10, James Watson & Co. said: "There has been considerable excitement in the Scotch Iron market this last week, and a very extensive speculative business has been transacted, while prices of Makers' Iron have likewise advanced. On Monday the market opened weak, with business from 43/3 @ 43/6, closing at 43/6 per ton. On Tuesday a moderate business was transacted from 49/ to 49/5 per ton. On Wednesday the price advanced to 49/10 per ton, while yesterday there was considerable excitement, and the market rapidly bounded from 50/ to 52/3, afterward receding to 51/3, and closing at 51/7½ per ton. To-day the opening price was 51/3, steadily firming up to 52/1, and closing sellers thereat, buyers 1½d. per ton less. The shipments last week were 12,527 tons, as compared with 8252 tons for the corresponding week of 1879." We quote:

	No. 1.	No. 2.
G. M. B., at Glasgow.....	52/6	50/6
Cartierie, at Glasgow.....	37/6	36/6
Colinvaux, ".....	36/6	34/6
Sumnerlee, ".....	52/6	51/6
Langdon, ".....	52/6	51/6
Langdon, ".....	52/6	51/6
Calder, at Port Dundas.....	52/6	51/6
Glenharroch, at Ardrossan.....	52/6	51/6
Kelliston, ".....	52/6	51/6
Dalmeilston, ".....	52/6	51/6
Shotts, at Leith.....	52/6	51/6

The shipments of manufactured iron and machinery from the Clyde ports within the week reached the value of £40,000—chiefly for India and Rio de Janeiro.

CLEVELAND PRICES

are to-day firm at the appended figures, which are likely to be revised upward within the week:

No. 1 Foundry.....	46/	No. 4 Forge.....	40/
" ".....	43/6	Mottled.....	39/6
" ".....	41/	White.....	39/
" ".....	40/	Kentledge.....	42/6

The returns of the Cleveland Ironmasters' Association for June show 110 furnaces in operation and 55 idle. A year ago there were 84 in and 81 out. Three new furnaces are in course of construction in the district. The total make of the month was 205,963 tons, of which 44,254 tons were spiegel and

other than ordinary pig. The foreign shipments of the month were 26,246 tons; and castwise, 38,441 tons. On June 30 makers' stocks were 103,366 tons; in public warrant stores, 102,690 tons; and in makers' stores, 42,157 tons.

HEMATITE PIGS

are quoted as under, with a tendency to go up:

	£	s.	d.
Cumberland hematite, No. 1.....	3	15	0
Ditto, No. 2.....	3	7	6
Ditto, No. 3.....	3	12	6
Ditto, No. 4.....	3	7	0
Bessemer, No. 1.....	3	12	6
Ditto, No. 2.....	3	12	6
Ditto, No. 3.....	3	12	6
K. H. hematite.....	5	0	0
K. H. Muselmouth.....	5	0	0
Thornaby hematite, No. 1.....	5	10	0
Nos. 3, 4 and 5.....	4	10	0

AMERICAN STOVES.

some of your readers may be glad to learn, are believed to be likely to sell well in Turkey, provided any of your stove people think it is worth while to trust the unspeakable Turk in the present impecunious condition of the national purse. It is, at all events, a fact that one of the Pashas (Said, I believe) has ordered a fine base burner, and that others are likely to follow. The harems are thus to be rendered more luxurious by American means.

MR. FREDERICK LEHMANN.

who has just been returned to Parliament as the Liberal member for Evesham, is probably known to many of your readers. He is senior partner in the firm of Naylor, Benson & Co., of Old Broad street, London. He was born at Hamburg in 1826, settled in England early in life, and married, in due course, a daughter of the late Dr. Robert Chambers, of Edinburgh.

RIFLES ARE WANTED.

I hear, in considerable numbers by a certain "power," which, although not wholly civilized, yet can boast of a very large share of what is commonly termed civilization. I think we may assume that Madagascar is meant by the description of which this is a summary, and I have also heard it stated that the quantity asked for is 20,000 rifles. It is not known why this particular island should need so many arms, unless, as is assumed by some persons, the government are resolved to push their quarrel with the French to the utmost pitch. In any case the order is understood to be floating about, whether anything comes of it or not. Perhaps it might be worth while to make inquiries about the matter generally on your side.

THE BOARD OF TRADE RETURNS

for the month of June, to which I have already briefly referred, have surprised most persons in the iron trade by the extremely favorable totals presented. The figures being official, however, and entirely beyond suspicion, they cannot be disputed. The total value of the exports last month was £18,462,854, whereas in June, 1879, the total was £14,583,540, and in June, 1878, £15,091,638. For the six months ending June 30 the total value of our exports was £107,633,136, against £88,826,493 in 1879, and £94,660,400 in the same period of 1878. The comparison is thus most favorable in both particulars. The imports of last month were valued at £37,437,693, against £27,768,780 and 28,661,103 in the same month of 1879 and 1878 respectively. The quantity of iron and steel exported last month was 361,865 tons, valued at £2,654,567, against 194,628 tons, and £1,462,290 in June, 1879. For the six months the tonnage was 2,105,105 and value £15,485,444, as against 1,213,628 tons and £8,531,777 in the first half of 1879. In a summarized form our metallurgical exports last month are thus set out, as to quantities or (and) values:

Articles.	1879.	1880.	Value.
Streams, No.....	38,397	10,612	£17,026
Copper, unwrought, cwt.....	2,735	84,398	87,797
Copper, wrt, cwt.....	30,494	32,550	108,859
Sheathing, cwt.....	33,442	44,447	91,440
Coal, &c., tons.....	1,579,278	1,725,696	688,118
Haw and cutlery.....	69,034	158,790	231,612
Big, tons.....	69,034	158,790	231,612
Big, single-bed.....	15,076	10,690	102,742
Iron rails, tons.....	1,764	25,417	7,315
Steel rails, tons.....	38,590	66,692	166,223
Railroad, tons.....	40,992	100,332	253,124
Wire (except telegr.).....	2,450	4,071	35,126
Hoops, sheets and boiler plate, tons.....	14,131	21,861	163,690
Tin plates, tons.....	15,076	20,664	325,442
Cast or wrt, tons.....	20,144	25,931	280,380
Old for re-manufacture.....	10,817	12,414	40,874
Steel, unwrought, tons.....	2,003	7,336	58,052
Mt. steel & iron, tons.....	857	1,424	60,360
Lead tons.....	4,071	39,993	59,510
Steam engines.....	.....	.....	538,759
Other descriptions of machinery and mill-work.....	.....	.....	442,781
Plate and pipe, and gilt ware.....	.....	.....	13,345
Tel. w. & apparatus.....	.....	.....	158,412
Con. therewith.....	.....	.....	158,412
Tin (unwrt.) cwt.....	11,141	5,909	39,514
Zinc & spelter, cwt.....	10,773	10,627	7,604

The figures are lower in most instances as regards the United States, compared with May, 1880, but the total tonnage value is singularly alike in the two months—thus:

May, 1880.....	360,603 tons.....	\$2,654,774
June, 1880.....	361,865 tons.....	\$2,654,567

EXPORTS TO THE UNITED STATES

last month are shown below, and compared with May, 1880, as well as with June 1879:

Articles.	1879.	1880.	Value.
Alkali, cwt.....	271,354	215,830	104,217
Hardware and cutlery.....	7,723	51,265	52,935
Hardware and cutlery.....	5,850	51,265	52,935
Hardware and cutlery.....	3,207	4,339	4,339
Hardware and cutlery.....	1,692	1,692	1,692
Hardware and cutlery.....	1,692	1,692	1,692
Hardware and cutlery.....	1,692	1,692	1,692
Hardware and cutlery.....	1,692	1,692	1,692
Hardware and cutlery.....	1,692	1,692	1,692
Hardware and cutlery.....	1,692	1,692	1,692

Month of	1879.	1880.	Value.
May.....	271,354	215,830	104,217
June.....	271,354	215,830	104,217
July.....	271,354	215,830	104,217
Aug.....	271,354	215,830	104,217
Sep.....	271,354	215,830	104,217
Oct.....	271,354	215,830	104,217
Nov.....	271,354	215,830	104,217
Dec.....	271,354	215,830	104,217
Jan.....	271,354	215,830	104,217
Feb.....	271,354	215,830	104,217

are thus enumerated for the month and also for the half year:

June,	1879.	1879.	1880.
To Russia.....	£3,204	£2,134	£1,167
Germany.....	7,715	7,174	7,010
Holland.....	7,675	6,123	7,206
France.....	7,683	9,154	9,178
Spain and Canaries.....	5,100	5,518	5,728
United States.....	10,033	20,211	4,171
Spanish West India Islands.....	9,448	6,541	6,079
Brazil.....	1,755	2,450	2,450
Argentine Republic.....	10,068	6,939	5,748
Brit. North America.....	14,310	7,045	12,597
British Possessions in South Africa.....	9,550	10,418	11,411
British India.....	13,140	17,842	14,144
Australia.....	57,857	44,008	33,910
Other countries.....	18,697	35,630	60,276
Total.....	£268,460	£231,672	£204,729
Six Months.....	18,768	18,792	18,783
To Russia.....	£27,541	18,792	£22,282
Germany.....	49,291	35,991	44,212
Holland.....	49,291	35,991	44,212
France.....	60,273	67,816	7,214
Spain and Canaries.....	54,565	40,713	51,885
United States.....	143,990	144,779	23,600
Spanish West India Islands.....	54,592	38,667	37,758
Brazil.....	10,047	10,855	12,679
Argentine Republic.....	47,777	44,100	36,841
Brit. North America.....	97,939	54,349	75,958
British Possessions in South Africa.....	6,165	72,923	79,391
Brit.-Ind. India.....	124,377	133,177	127,551
Australia.....	40,678	33,737	18,600
Other countries.....	30,975	37,550	37,473
Total.....	£1,594,880	£1,400,882	£1,428,471

to replace old iron steamers now plying between France and Belgium on the one hand, and England on the other by new steel ones. Coal.—The coal market in Belgium is in a satisfactory condition. Prices are steady, and companies find no difficulty in placing their more moderate output at 9 to 13 francs.

GERMANY.

HAMBURG, July 12, 1880.—Iron.—Our Dortmund report reads as follows: "Siegen Puddle Iron has risen 1 to 2 marks; but in spite of this no improvement can be reported in Merchant and Sheet Iron. On the contrary, they are both lower, especially sheets. Bar iron, our works quote, 135 @ 140 marks; but some Rhinish concerns sell as low as 130, and even below. At our works prime sheet is quoted 102, and second quality 180, but the Duisburg works ask 10 marks per ton more. From the province of Saxony, a firm allied to in our last, is still offering prime sheets at 120, second quality at 160, and Merchant Iron at 125 marks per ton. Rails at the last adjudication at Frankfurt, June 30, were offered at 185 @ 195 from the works, while on April 7 they sold at 210 @ 225. This shows a notable decline. Most of our works do not, however, complain of a lack of work. For rails, in particular, large orders are still unexecuted—most of them received from the United States when prices were high. Thus the Dortmund Union received from Belgium an American order at the time for 10,000 tons rails. The Bochum Cast Steel Union is engaged in rolling 8000 tons rails for Italy. The smaller works have, most of them, but small orders on hand. Coal.—Most of the works in this district have bought their coal for the second half of 1880. Prices are 4 marks for 100 cwt. higher than last year at this time. In the Rhinish provinces and Westphalia, iron prices have again given way a little during the week. In Upper Silesia the situation does not improve. The larger works have got orders for some months to come, but the smaller ones have from time to time to make a way for speculative lots, acquired at high prices, are still being pressed upon the market. Holders of these lots sell at almost any price in Silesia, in order to rid themselves of the engagements, which they are financially incapable of carrying out. Metals.—Lead has improved. We quote: English pig, 17.50 @ 17.50 marks the 50 kilos; ditto sheet, 17.50 @ 18; German pig, 16.50 @ 17; and Spanish, 18.50. Copper.—Unchanged. We quote: Swedish Atvidaberg Ingots, 74; Drontheim Roosa Rosettes, 74 @ 75; Refined English, 68 @ 69; and ditto sheeting, 77. Tin is sustained. Banca and Australian, 88 @ 92; and English, 92 @ 95. Spelter is quiet at 10, on the spot and to arrive, and Sheet Zinc, 23.50 @ 24.50.

AUSTRIA.

VIENNA, July 11, 1880.—Iron.—In Austria-Hungary the iron market in general has not been so uneven during the week, but there are signs of an approaching amelioration, farmers being more ready to lay in supplies of everything in the implement and hardware line. There is a demand for agricultural machinery and instruments. The hardware demand will only begin to fully develop till after harvesting time. In view of this encouraging aspect, the iron price, which is firmer in the hands of dealers, while producers maintain their combination rates. Rolling mills at the North are busy in turning out Bar Iron and Sheets, and there are also unfilled a good many rail orders. The Wiener Neustadt have just sold 1000 tons Steel Rails for Russia at 9.75 florins, deliverable at a frontier station. This is still a good price, and it could not be obtained in Russia in competition with the Wiener Neustadt. On the 1st instant the Bohemian Iron Works have met and agreed to maintain the basis of prices hitherto prevailing. All discounts to dealers are to be made known at once, and the preference given, in point of price, to wholesale merchants at Prague is to be discontinued. The Moravian and Silesian Works begged to be excused for not attending, but requested to be made acquainted with the agreement arrived at. The iron market at Vienna is looking up in sympathy with more favorable advices from abroad. Sales in the interior are also effected with greater ease, although the demand there is not quite so active as it is here. We quote in florins per 100 kilos: Fig. 60 @ 61; Gray ditto, 60 @ 61; Bessemer Fig. 60 @ 61; at the works; Bar Iron, Styrian and Cornishian, 14.50; Bohemian and Hungarian, 13.50; Sheets for locomotives, 15 @ 17; for roofing, 17 @ 18; for boilers, 17 @ 18; for tanks, 17 @ 18; per ton at Vienna. Metals.—There has been an upward tendency generally, and we quote at the close per 100 kilos, in florins: Copper, 74 @ 75; Tin, 1.15 @ 1.16 for English and Banca, and 1.04 for Billiton; Antimony, 85; Lead, 20.22 @ 22.50; Shot, 26.50 @ 28.01; Spelter, 22 @ 24.50; Sheet Zinc, No. 6 to 20, 31 florins; Banca, 88 @ 92; Nickel, 10.50 @ 11.50; Bismuth, 11.75 per kilo; Copper Vitrol, 31 @ 33; White ditto, 14; Green ditto, 6; Zinc White, 34 @ 40.

HOLLAND.

ROTTERDAM, July 13, 1880.—Tin.—This metal has continued to tend upward and affords an opportunity for extensive speculative transactions. In sympathy with the movement in England as much as 52 guilders the 50 kilos, has been paid here, and more could be sold at this figure, but holders now ask more. Billiton was still obtainable yesterday at 51.50. The Netherlands Trading Co. will sell, on July 25, at auction, 20,000 slabs Banca Tin. The course of prices of Banca Tin, in guilders, per 50 kilos, during the past eight years has been the following:

	1874	1875	1876	1877	1878	1879	1880
Jan. 1	51.75	52.75	53.75	54.75	55.75	56.75	57.75
Feb. 1	51.75	52.75	53.75	54.75	55.75	56.75	57.75
Mar. 1	51.75	52.75	53.75	54.75	55.75	56.75	57.75
Apr. 1	51.75	52.75	53.75	54.75	55.75	56.75	57.75
May 1	51.75	52.75	53.75	54.75	55.75	56.75	57.75
June 1	51.75	52.75	53.75	54.75	55.75	56.75	57.75
July 1	51.75	52.75	53.75	54.75	55.75	56.75	57.75
Aug. 1	51.75	52.75	53.75	54.75	55.75	56.75	57.75
Sept. 1	51.75	52.75	53.75	54.75	55.75	56.75	57.75
Oct. 1	51.75	52.75	53.75	54.75	55.75	56.75	57.75
Nov. 1	51.75	52.75	53.75	54.75	55.75	56.75	57.75
Dec. 1	51.75	52.75	53.75	54.75	55.75	56.75	57.75

The prices paid at auction for Banca Tin since 1874 have been the ensuing:

Month	Price
1874, January 1	44.00
1874, May 1	44.50
1874, September 1	45.00
1875, January 1	45.50
1875, May 1	46.00
1875, September 1	46.50
1876, January 1	47.00
1876, May 1	47.50
1876, September 1	48.00
1877, January 1	48.50
1877, May 1	49.00
1877, September 1	49.50
1878, January 1	50.00
1878, May 1	50.50
1878, September 1	51.00
1879, January 1	51.50
1879, May 1	52.00
1879, September 1	52.50
1880, January 1	53.00
1880, May 1	53.50
1880, September 1	54.00

A Challenge to the Steamer Anthracite.—The Herreshoff Manufacturing Company, of Bristol, R. I., have issued the following challenge: In view of the very general interest taken by steam users and the public in general in the little steamer Anthracite and the Perkins system of boilers and engines, we should be pleased to meet the Anthracite in a competitive trial with our own coal boiler and engines of the compound type. The question of economy in generating and applying steam is one of such importance to the entire community, that we will be glad to contribute our share toward satisfactorily settling the matter. We hope, therefore, that the owners and agents of the Anthracite will afford us the opportunity, at an early day, of testing our system on board the steam yacht Leila, in relation to speed and economy, with the Perkins system, under such terms and conditions as may be mutually agreed upon. The Leila is 85 feet long and 15 feet beam.

INDUSTRIAL ITEMS.

MAINE.

The Cameron-Estes Plow Company is a new Portland corporation which begins business with a capital of \$300,000, of which \$75,000 is working capital and \$12,000 is placed. The officers are: President, J. H. Whitney, of Portland. Secretary and treasurer, H. M. Sylvester, of Portland. Directors, J. H. Whitney, W. F. Cameron, H. M. Sylvester, of Portland; Henry L. Washburn, Robert Johnson, of Boston.

MASSACHUSETTS.

Machinery has been placed in the Pierpont Silver Plating Works at New Bedford, and it is intended to have the product of the establishment on the market by August 1.

The new furnace stack of the Orange Iron Foundry Company has been put in place. It is 60 feet high and 6 feet in diameter, and is capable of melting 26 tons at a time.

It is announced that Weir Village is to have a new enterprise in the shape of nickel-plating works. Messrs. Evans, Rose and others are movers of the project, and a building 75x30 feet is to be put up for their use. The business has been carried on at North Dighton. The nickel-plating of stove trimmings and other appendages of cast iron has become quite a business, and as Taunton has eight foundries in operation, all of which are under the necessity of transporting their finishing work away for the nickel-plating process, the advantages of the new location will be readily seen.

Munn & Baush, the Holyoke iron founders, contemplate the enlargement of their works at an early date.

Another addition is to be built to the Eagle Stove Foundry at Bowenville (Fall River), the foundation of which is already laid.

The Tremont Nail Works have been taking a brief rest and making some repairs.

CONNECTICUT.

The machinery for the new cutlery company at Union City has arrived, and the works are about to begin operations.

The Waterbury Watch Company are now working full time. Work is being pushed as rapidly as possible upon the new manufactory, which will be in readiness for occupancy by January, 1881.

NEW YORK.

Among the industrial establishments of Auburn the following are more or less closely allied to the iron trade: The extensive harvester works of D. M. Osborne & Co.; the thrashing machine works of A. W. Stevens & Son; the axle works of Sheldon & Co.; the carriage hardware works of the E. D. Clapp Manufacturing Company; the agricultural tool works of the Auburn Manufacturing Company; the 327th works of Wadsworth & Son; the hollow-ware foundry of Foxell & Jones; the Auburn Tool Company's works; the hame and harness trimming factory of Hayden & Smith; a boiler shop, 27 machine shops and 4 foundries. Sheldon & Co. have a rolling mill of their own, D. M. Osborne & Co. operate the Auburn Iron Works on a lease, and the Clapp Manufacturing Company are building a mill. All these establishments are doing a large business, and many of them are constantly increasing their facilities.

PENNSYLVANIA.

The puddling department of the Bethlehem Iron Company, which has been idle for several weeks, started up on the 10th.

The rolling mill of Jos. L. Bailey & Co., at Pine Iron Works, Berks County, began to run double turn on the 20th. Owing to the low water it has been running single turn for two or three weeks.

The following is a comparative statement of coal production in Pennsylvania for June:

	June, 1880	June, 1879	Dec.
Phila. and Read.	481,599	660,060	188,360
Lehigh Valley	359,260	417,619	58,358
Del., L. and W.	260,195	348,581	79,386
Del. and Hudson	188,738	317,413	29,074
Pennsylvania	1,289,792	1,664,981	356,878
Penna. Central	77,857	135,918	58,090
Total	1,367,649	1,800,969	414,968

The Hampton Furnace of the E. & G. Brooke Iron Company, near Birdsboro, is ready to go in blast, after having been idle for seven years. It was chilled while running on anthracite iron, but has now been altered so as to run on charcoal iron exclusively. The furnace will be filled and lighted in a few days.

It is currently reported that a new glass factory is to be started at Beaver Falls, to make blown ware principally, and that John Schultz, late manager of the Beaver Falls factory, will hold a similar position in the new concern.

The receivers of the Philadelphia and Reading Coal and Iron Company will issue no circular of prices for coal for August, as the current prices have been determined upon for next month.

The rolling mill of Hon. Jeremiah H. Boone, at Norristown, has been restarted, and will run day and night until further orders. The puddlers commenced work on Monday evening, the 19th. The blast furnace which had blown out is idle.

The old foundry at Roversford, lately rented by Shantz & Keely, proprietors of the large stove works in Spring City, is now in full blast, as is the one lately purchased by the new firm, Grand, Springer & Co.

It is stated that the furnaces of the Reading Railroad will be held on to until the next boom in iron shall arrive, when they can be disposed of to better advantage than if forced upon the market now.

The rolling mill of McIlvain & Sons, Reading, has shut down three weeks for repairs.

Of the nine furnaces located in Schuylkill County, but one is in blast, viz., one of the three owned by Atkins Bros., of this place. Those out of blast are the St. Clair, Port Carbon, New Ringgold, Stanhope, Minersville, Kauffman's (near Auburn), and two owned by Atkins Bros. With a marked improvement in prices, some of these, but scarcely all, will blow in; and until such time as this occurs, those furnaces who are now working will be enabled to manufacture certainly without loss. No. 1 foundry iron is now selling at from \$26 @ \$28 per ton and No. 3, mill iron or gray forge, at from \$21 @ \$22.—Pottsville Miners' Journal.

No. 4 furnace at the Crane Iron Works is

being blown out after a run of about four years. Work will be immediately commenced at relining and preparing her for further operations.

F. J. Obert, proprietor of the Union Boiler Works, of Reading, has failed for about \$75,000. Mr. Obert asked for an extension of five years, but immediately after the adjournment of the creditors' meeting three judgments were entered in the prothonotary's office against Mr. Obert and executions taken out, and all his real estate and personal property is offered for sale by the sheriff. Mr. Obert has leased the Union Boiler Works to his son, Francis J. Obert, Jr., who will hereafter carry on the business and keep all the hands employed, numbering nearly 100. There are plenty of orders on hand to keep the works in active operation.

One hundred more ovens will be finished at the Cambria Iron Company's new works at Morrell this week. One hundred more will be completed in about a month, and their fourth hundred will be in operation within three months. The coke is being shipped to their mills at Johnstown.

The wire works of the Gautier Steel Co., Johnstown, started up double turn in all its departments on the 19th, after a suspension of three weeks for the making of needed repairs to machinery, &c.

The old furnace at Dunbar will be blown in as soon as the repairs which are now being made are completed. A tract of limestone land near Cumberland has been bought by the furnace company, so that both the old and new furnaces can be supplied.

The new blast furnace, No. 7, of the Cambria Iron Company was blown in last week and seems to be doing very well. The furnace is one of the finest in the country and is fitted up with all the latest improvements.

The Baldwin Locomotive Works, at Philadelphia, have just shipped 6 street motors to Australia, and are in receipt of a further order for 23 more for the same company.

In Sydney and other leading Australian cities these motors have proved entirely successful, and on some roads will be used exclusively.

The rapid substitution of steel castings for expensive forgings, and for iron castings where great strength is required, has compelled the doubling of the capacity of the works of the Chester Steel Castings Company during the past year; and now the company announce a still further extension of their establishment. Their chief success, as well as the heaviest part of their business, is in the production of heavy gear wheels, pinions, roll spindles, couplings, coupling boxes, &c., for rolling mills and sugar mills.

In heavy plate mills their steel castings outlast many times the iron castings formerly used. It is claimed, also, that nearly all the locomotive builders and makers of large steam engines are now using the Chester castings, and that the 15,000 crank shafts and several thousand cross-heads on locomotives of their make show a better record for durability and smoothness of wear than any equal number of forged pieces for the same uses.

There is now in course of construction at the Southwick Iron Foundry, Philadelphia, an engine upon the result of the workings of which a great deal is staked relative to the success or failure of the electric light of Prof. Edison. In making his numerous experiments with the light Mr. Edison found great difficulty in procuring an engine that would run the dynamo-electric machine sufficiently fast and steady to produce a good light. Up to this time none could be found, and the desired revolutions have been made up in a manipulation of belting. This has proved decidedly unsatisfactory, because the belts make the light unsteady, and, therefore, unfit for the purposes designed. Some time ago the Southwick Company, which manufactures a high-pressure engine—the Porter-Allen—received an order from Mr. Edison to manufacture an engine that would make 600 revolutions per minute. This is to be of 100-horse-power, and, if it proves successful, then the great trouble which has encompassed the Edison light will be overcome. Last week, and before the first engine was well under way, another order was received for a 120-horse-power engine. The highest number of revolutions heretofore attained by any one of the Porter-Allen engines has been 500 revolutions per minute. The result of the experiment will be waited for anxiously by engine builders all over the country, and should Philadelphia mechanics provide just the thing needed there will be a big boom in Southwick to supply the demand.

PITTSBURGH AND VICINITY.

George A. Macbeth & Co., Southside, have fire in their furnace and expect to begin work.

Mr. James Walters is the successor of H. D. Murray as actuary of the Western Lime and Flint Glass Association. He entered on his duties on the 12th.

A steel shaft has been completed by the Nashua Iron and Steel Company, of Nashua, N. H., for the steamer George Lysle, of Pittsburgh. It is 28 feet 2 inches long by 12½ inches in diameter.

The Richards & Hartley Flint Glass Company put fire in their furnace last week, and will begin manufacture on or about August 1. They are already in receipt of a fair number of orders and anticipate a heavy fall trade.

OHIO.

"Big Etna" Furnace is in blast again.

The hearth was put in and the boilers repaired at Mt. Vernon Furnace last week. The furnace will start up about the middle of this week.

The castings for the large stack at Belfont Furnace are now being made, and the work of completing the stack, which was begun last fall, will go on.—Ironing Register.

The Lawrence Iron Works, at Ironton, will shut down the last of this week for repairs and to take stock. The stoppage will not continue longer than a week or ten days.

The works of the new Union Window Glass Company, at Bellaire, are about finished, and will be ready for window-glass making in August.

WEST VIRGINIA.

The Blooming Charcoal Furnace, in Hampshire County, is being remodeled from plans

prepared by John Birkinbine, C. E., of Philadelphia, and will shortly be in operation under the management of the Blooming Furnace Co. The furnace is prepared to run either cold or warm blast, and will start on car-wheel iron made from local ores, of which there are considerable on the property. The furnace labors under the disadvantage of being away from railroad facilities; but the abundance of good timber, the quality of the ore supply and the cheap labor is expected to fully compensate for the haul over the hills. The furnace, as remodeled, is 40 feet high by 9 feet bosh, blown by a vertical steam blowing engine.

KENTUCKY.

The Pennsylvania Furnace made a brief stop last week in order to admit of some repairs.

The Ashland Furnace has completed repairs of one of her hot blast ovens, and continues on a regular average of over fifty tons of excellent iron per day. A new dry well is now being sunk to replace the one injured by last winter's flood.

The Monitor Furnace is working well, averaging 6 to 7 tons car wheel per day.

ALABAMA.

On June 18, Tecumseh Furnace, in Cherokee County, owned by Hon. Willard Warner, running on charcoal, entered on the sixth year of its blast on one hearth without blowing out, and is doing well. The hearth is of fire-brick, made by the Scioto Star Fire-Brick Works, of Portsmouth, O.

ILLINOIS.

The working force on the Allen and Pullman Car and Paper Car Wheel Works, at Pullman, near Chicago, has been increased to 500 men, and the walls of the building are rapidly rising. Car loads of all varieties of lumber are continually arriving and being piled up to dry in the lumber yard on the lake shore. The material is to be used for car-building purposes.

A new glass bottle house will be built in Ottawa this season. About 100 hands will be needed. The firm propose to begin making bottles on or about the first of September.

Among the building permits issued last week was one to the Chicago Car Wheel Company to erect a foundry, 116 x 63 feet, to cost \$10,000.

MISSOURI.

The St. Louis Wire Mill Company are making preparations to put into their new establishment machinery for the manufacture of every variety of wire nails.

The immense steam pumps in use at the Vulcan Steel Works, which supply the motive power by which all the hydraulic machinery there is operated, were built by Henry R. Worthington, of New York.

The Harrison Wire Works, of St. Louis, are as busy as ever manufacturing steel and iron wire. The new galvanizing apparatus in operation there is working well, and large quantities of both round and flat galvanized wire are being turned out.

MICHIGAN.

The blowing in of the Pacific furnace has been delayed by several causes, principal among which was the burning of the Excelsior, which necessitated a new hearth and lining, in order to adapt the stack to the use of charcoal, and thus enable the lessees to fill their contracts for the delivery of charcoal iron. In making this change a large salamander was found in the bottom of the stack which had to be removed by blasting, but which would have been no impediment if the stack had been blown in on bituminous coal. In addition to this the machinery, hot blast, &c., which had not been in use for a long time, was found in very bad condition and requiring a general course of repairs; in fact, a new hot blast had to be put in, the pipes in the old one being twisted and well-nigh worthless. As it now looks, the fires will not be re-lighted before the end of six weeks or two months.—Marquette Mining Journal.

We learn that an eastern company contemplate the erection of a blast furnace at Point St. Ignace.

TENNESSEE.

Col. S. B. Lowe has erected extensive works at Chattanooga for the manufacture of mineral paints from the native Southern ores. The machinery is of the most approved and modern make, and has a capacity of from 5 to 7 tons per day. The works have been in operation but a short time, and orders for the product have been entirely satisfactory. The quality has been well tested by practical painters and pronounced quite equal to any paint of the kind in the market. The paint so far made is a dark red, and contains 56 per cent. of metallic iron, and when spread produces a bright glossy surface. Col. Lowe has also secured a large quarry which will produce a fine yellow ochre, and also another bed of the put of which is a very bright vermilion, the latter containing 49 per cent. of metallic iron. These paints are all found to shade readily, and have in all respects proved most satisfactory. They will be turned out at the factory packed in barrels of about 600 pounds weight each.

Reynolds, Hulings & Co., late of Cincinnati, have purchased extensive quarries of variegated marble in McMinn County, East Tennessee, and have thoroughly opened them and had the quality tested. The stone in their ledges is as fine as any of the kind ever seen, and peculiarly sound and free from checks and blemishes. They have also purchased a larger well-tested quarry of lithographic stone. For the purpose of putting these products on the market in a more finished form, the company have purchased ground near Lowe's paint works, and will at once erect four gangs of saws to saw up the marble and lithographic stones into slabs. Large amounts of both are now being shipped from the quarries in the rough.

The Eighth Cincinnati Industrial Exposition will open on the 8th of September next, and close on the 9th of October. Its books are now open to exhibitors who desire to select space in the permanent buildings. The Cincinnati Exposition has attained a national reputation; last year 24 States were represented in it, and it was attended by 422,957 visitors. The management is guaranteed by a popular public subscription,

held under the joint auspices of the Cincinnati Chamber of Commerce, the Board of Trade and the Ohio Mechanics' Institute. There is no charge made for space or steam power.

Production of Coal in England and the Loss of Life in Mining.

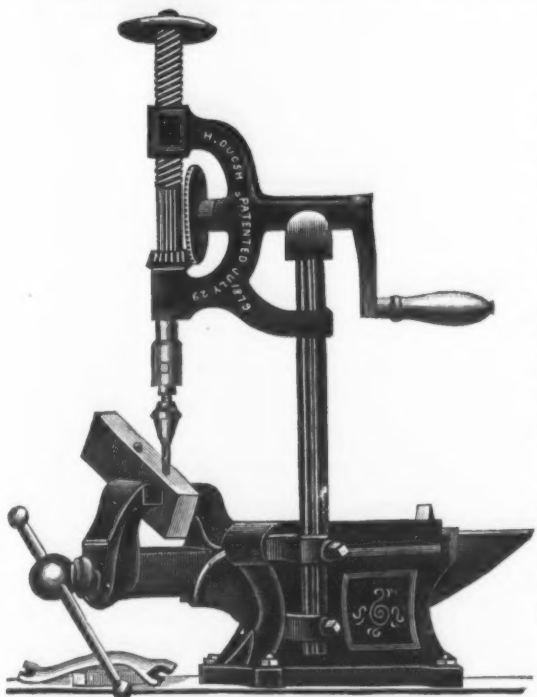
The annual report of the British Inspectors of Mines for 1879 has just been issued. According to the figures given it appears that the returns have been the most favorable as regards accidents and loss of life which have appeared for several years past. There were 782 separate accidents in 1879, against 811 in 1878, while the number of deaths resulting shows a decrease of over 31 per cent.—973, against 1413. The 35 separate explosions caused 184 deaths, or rather more than five deaths on the average to each explosion, which is a far more satisfactory percentage than usual, and the remaining 747 separate accidents caused but 789 deaths, which is highly gratifying, since it shows that only one accident in 20 was fatal to more than one person. When it is considered that no less than 476,810 persons were employed, with a loss of but 973 lives, or one life for every 490 men employed, colliers may be congratulated upon the fact that, owing to the excellent management and extraordinary precautions taken, they are freer from danger while at work than nineteenth of the artisans employed above ground; and that, considering the number of lives risked, the collieries of Great Britain are absolutely safer than the streets of London. During 1878 there were 475,329 persons employed, and they raised 132,612,063 tons of coal, 1,625,586 tons of fire-clay, 10,747,227 tons of ironstone and 813,262 tons of shale—altogether, 145,798,138 tons, so that one life was lost for each 103,183 tons of mineral raised, and there was one death for every 336 persons employed. During 1879 the 476,810 persons employed raised 133,720,393 tons of coal, 1,455,003 tons of fire-clay, 9,387,766 tons of ironstone and 803,207 tons of oil-shale, &c.—together, 145,366,369 tons, showing one life lost for each 149,400 tons of mineral raised, and one death for each 490 men employed, as already stated. The loss of life by fire-damp explosions naturally exhibits very large fluctuations. Thus, 586 men were killed by 31 accidents of this class in 1878, while only 184 died in consequence of 35 explosions in 1879. The number of deaths from other causes remains remarkably constant. In 1878 and 1879 they were, respectively: 469 and 426 from falls of coal, and 111 and 120 in shafts, and 247 and 243 from miscellaneous causes in the mine and at the surface.

The number of persons employed during 1879 in and about the mines classed as metalliferous was 47,060, against 51,458 in the preceding year. Of the total number employed in Great Britain 27,374 were underground, and 18,266 above ground. And in Ireland 891 underground, and 529 above ground. The fatal accidents in these mines amounted to 61, against 74 in the preceding year, the casualties thus being 13 per cent. less numerous than last year. From these accidents the number of deaths resulting was 64, being 13 less than in the preceding year. It appears that in 1879 there was one fatal accident among every 771 persons employed in and about the mines, and one death by accident among every 735 persons employed; and in 1878 one fatal accident among every 811 persons, and one death by accident among every 1415 persons employed in and about the mines.

French Trade Statistics.

The French Customs tables for last year, recently published, show that the imports into France have been steadily increasing during five years, while the exports have been decreasing. Excluding coin and bullion, the aggregate value of imports has advanced from 3,536,654,000 francs in 1875 to 4,594,837,000 in 1879; while the value of the exports has decreased from 3,872,632,000 francs in the former year

ANVIL, VISE AND DRILL.



This machine was first made by a practical mechanic for his own use, and to meet a want which nothing in the market would fill. It was so highly regarded by all who saw it that he was induced to get it patented and manufactured for the market. When it was brought to our attention we saw at once its great utility, and bought the exclusive right for the whole United States. We believe it will come into general use as fast as its merits become known. The anvil face is 4x8 inches, and height 6 inches. Width of vise jaw, 3 1/2 inches; steel drill press, with adjustable chuck to hold 1/2-inch drills, and all smaller sizes. The article to be drilled can be held firmly in the vise, so as to be drilled at any angle, or if it is too large for the vise it can be drilled on the anvil. The drill may be removed when not in use. Price for the whole, \$18. Weight, 80 pounds. The vise and anvil are complete without the drill, and are sold for \$10; weight, 60 pounds. For all jobbing shops, it is worth much more than it costs. Farmers can do with it many jobs which otherwise would have to be sent to the shops. All Hardware dealers who do not keep them in stock will furnish them on demand, or we will send them on receipt of the price.

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HEATON & DENCKLA,
Hardware Commission Merchants,
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E. & C. BROOKE'S "Anchor Brand" Nails, Brads, Spikes, &c.
MALLORY, WHEELER & CO.'S Door and Pad Locks.
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AMERICAN MACHINE CO.'S Fluters, &c.
STUART, PETERSON & CO.'S Tinned and Enamelled Ware, &c.
HUSSEY, HOWE & CO.'S Bar & Sheet Cast Steel.

Also a large line of Heavy and Shelf Hardware.

PROVIDENCE TOOL CO.,
Providence. New York. Boston. Chicago.
GALVANIZED HAMMOCK HOOKS,
To Screw or with Thimbles.



Diameter..... 3/4 7-16 1/2
Price, per doz..... \$1.60 1.80 2.00



Price..... 3/8, 7-16, 1/2, all \$1.75 per dozen.
A liberal discount to the trade. Send for a sample lot.

HENRY B. NEWHALL,
105 Chambers Street, New York Agent.

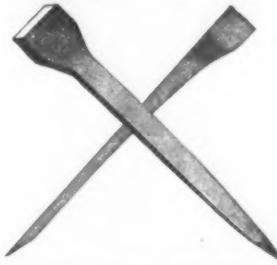
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92 CHURCH STREET, NEW YORK,
MANUFACTURERS' AGENTS.
Bargains in Hardware & Cutlery.



NEW NEW sizes, Patent Malleable Iron Castings, Nos. 2 and 3.
pattern Heavy Screw Clamps; strongest in the market.
Send for Price List.
Malleable Iron Castings
Of superior quality, and Hardware Specialties in Malleable Iron made to order.
HAMMER & CO., Branford, Conn.

NATIONAL Horse Nail Co.

MANUFACTURERS OF
FINISHED
[BRIGHT OR BLUED]

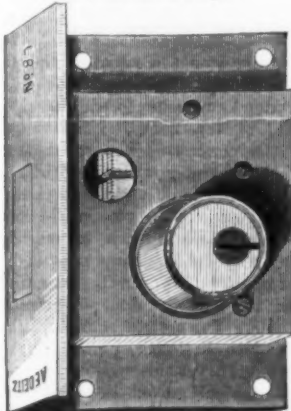


These nails are made of the best brands of **NORWAY IRON**, and are guaranteed to be equal to any in the market.

NATIONAL HORSE NAIL CO.,
VERGENNES, VT.
DURRIE & McCARTY, Agents,
No. 97 Chambers St., New York

A. E. DEITZ,
(Successor to Barnes & Deitz.)
Manufacturer of

Store Door Locks, Night Latches, Padlocks, Drawer Locks, &c., with Flat Steel Keys.



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Forged Horse Shoes,
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Patent Toe Calks,
Superior to any in market.
Send for prices and samples.
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Acid Nickel Plating Solution.
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Is now prepared to fill all orders of 50 gallons and upward for his Nickel Plating Solution, the use of which the U. S. Court of N. Y. has decided to be no contempt of the United Nickel Co. injunctions. See *The Iron Age*, April 22 and 29, 1880, and *The Metal Worker*, April 24 and May 1, 1880. All orders must be addressed to

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SCALES
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Patent "Self-Adjusting" Railroad Track Scales, pronounced "the most accurate and durable" over all competitors at World's Fair, 1876. In use by Pennsylvania, Lehigh Valley, Baltimore and Ohio, and other Railroads. Patent Coal and Hay Scales. Warehouse and Platform Scales and Scales for all purposes. Machines for testing materials, all sizes.
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Manufacturers of Olsen's Little Giant Testing Machine, and Improved Railroad, Wagon and Furnace Chasing Scales.
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GENUINE IMPROVED AND MECHANICS
Wide Bar Full Length. Wide Bar Full Length.
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UNDER PATENTS DATED

NOVEMBER 10, 1863,
FEBRUARY 23, 1864,
REISSUED JUNE 1, 1869,
IMPROVED AUG. 1, 1877.

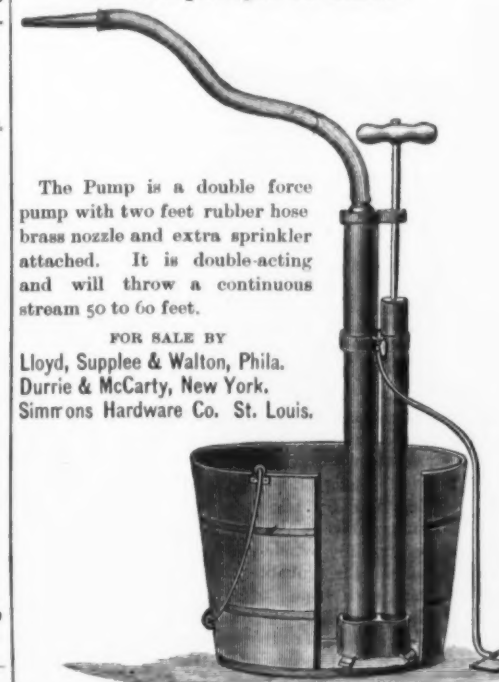
The back thrust when in use borne by the SHANK instead of the Handle
None genuine unless stamped "L. COES & CO."

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HOLLAND PATENT PUMP.

The Best and Cheapest Article of the kind ever put upon the Market.



The Pump is a double force pump with two feet rubber hose brass nozzle and extra sprinkler attached. It is double-acting and will throw a continuous stream 50 to 60 feet.

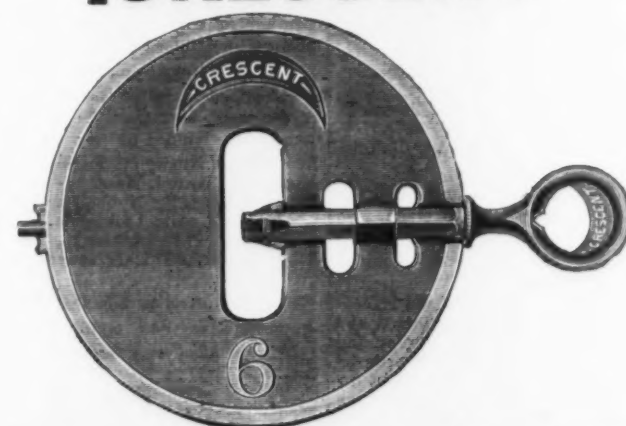
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Lloyd, Supplee & Walton, Phila.
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The Pennsylvania LAWN MOWER
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"CRESCENT"



STOVE PIPE DAMPER.

PATENT APPLIED FOR.
THE BEST THING OF ITS KIND IN THE MARKET. CONSTRUCTED ON AN ENTIRELY NEW PRINCIPLE, EMBODYING SIMPLICITY, EFFICIENCY AND NEATNESS.

No Small Pieces to Lose, No Spring to get Out of Order, No Nut to Work off.
This Damper consists of but TWO pieces—the STEM and BLADE—the parts being so constructed that when the former is inserted (either side up) it engages within a notch near its end and a raised catch formed on the blade, which effectually prevents the stem from working out while in practical use, and at the same time admits of its withdrawal by the application of a little extra pressure outward. The Damper is held in any desired position by the pressure brought to bear on the pipe between the shoulder of the handle and the ends opposite and around the pivot formed on the blade. Owing to its simple construction, no directions for attaching are necessary.

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H. S. MANNING & CO.,
Sole Sales Agents for THE MORSE TWIST DRILL AND MACHINE CO.'S



Manufacture of Patent Machine Relieved Nut, Hand, Blacksmith and Machine Screw Taps, Screw Plates, Tap Wrenches and Patent Relieved Pipe Taps and Pipe Reamers, also of Solid Bolt and Pipe Dies. Furnished in U. S. Standard and Whitworth shape of threads.

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CLARK, WIDDIFIELD & CO.,
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PRICES.—Quarts, \$1.00; Half Gallon, \$1.50; Gallon, \$2.00. Liberal discount to the trade. Agents wanted in every city to canvass for the Jobbing and Retail Trade. The cuts in this advertisement represent the quart size. The gallon and half gallon sizes are made to screw to a table and have wooden lever, giving greater purchase in pressing.

National Association of Stove Manufacturers.

Fifth Semi-Annual Meeting.

NIAGARA FALLS, July 23, 1880.

The National Association of Stove Manufacturers was called to order at the Cataract House, Niagara, at 11 o'clock, General Jno. F. Rathbone, president, in the chair. In the absence of Colonel Bowditch, secretary, Colonel Walter Warren, of Troy, was chosen secretary *pro tem*. The following gentlemen responded to the roll call:

C. H. Buck; Buck's Stove Co., St. Louis, Mo.
John B. Hughes; Perry & Co., Chicago.
L. B. Try; Fuller, Warren & Co., Chicago.
F. B. Fox; Fuller, Warren & Co., Cleveland, Ohio.
Otto Germer; Black & Germer, Erie, Pa.
Samuel Smyth; Union Stove Mfg. Co., Pittston, Pa.
S. C. Rodgers; official stenographer, Troy, N. Y.
Jno. S. Perry; Perry & Co., Albany, N. Y.
J. B. Taplin; Taplin, Rice & Co., Akron, Ohio.
D. M. Thomas, secretary Detroit Iron and Brass Mfg. Co., Detroit, Mich.
Frank H. Tefft; Detroit Iron and Brass Mfg. Co., Detroit, Mich.
N. Brayer; Co-operative Foundry Co., Rochester, N. Y.
Clarence Rathburn; S. H. Ransom; Ransom Stove Works, Albany, N. Y.
Andrew Dickey; Perry & Co., Albany, N. Y.
James H. Coddington; Dighton Furnace Co., North Dighton, Mass.
A. G. Patton; Patton Mfg. Co., Columbus, Ohio.
Francis Kernan, Jr.; Russel Wheeler, Son & Co., Utica, N. Y.
John D. Green, treasurer Union Stove and Mfg. Co., Pittston, Pa.
Edward A. Burdett; Burdett, Smith & Co., Troy, N. Y.
John F. Mills; Abendroth Bros., New York.
Isaac A. Sheppard; I. A. Sheppard & Co., Philadelphia and Baltimore.
G. F. Filley; Excelsior Mfg. Co., St. Louis, Mo.
Walter P. Warren; Fuller, Warren & Co., Troy, N. Y.
C. H. Castle; Comstock, Castle & Co., Quincy, Ill.
M. I. Mills; M. B. Mills, A. E. Swift; Michigan Stove Co., Detroit.
R. P. Myers; Myers, Osborn & Co., Cleveland, O.
W. H. Tefft; Detroit Stove Works, Detroit.
John F. Rathbone, Grange Sard, Jr.; Rathbone, Sard & Co., Albany.
S. T. Peckham; J. S. & M. Peckham, Utica, N. Y.
Charles B. Boynton; Richardson, Boynton & Co., New York.
Charles B. Bernard; Cleveland Stove Co., Cleveland, O.
W. H. Whitehead; Chicago & Erie Stove Co., Chicago.
Sherman S. Jewett, Josiah Jewett; Sherman S. Jewett & Co., Buffalo, N. Y.
E. W. Peck; Co-operative Foundry, Rochester, N. Y.
J. Antice; Sill Stove Works, Rochester, N. Y.
U. Hill, Jr.; Union Stove Works, Peekskill, N. Y.
A. S. Hubbell; Hubbell & Bro., Buffalo, N. Y.

There was also present a number of gentlemen not connected with the trade, who attended by invitation.

Gen. Rathbone delivered the following as the address from the chair:

In accordance with the call of the Executive Committee, to whom was referred the time and place for holding the semi-annual meeting of this association which was ordered by the meeting last winter, we now meet for consultation, that as the result of our united wisdom we may so shape our business for the coming months that it shall prove remunerative. We have suffered for some time in consequence of the unwise action of the makers of pig iron, who, in connection with speculators, forced the price of raw material to so high a point as to invite foreign competition and the importation of enormous quantities of pig iron, rails, scrap, &c. The result of this boom has been the distrust and want of confidence as to the future. It is pleasant to know that the tide has turned; that the price of iron has materially advanced, both here and abroad, and that this change is marked by the certain and confident assurances that it is not speculative, but induced by actual consumption and the increased business of the country. In the last fortnight American iron has advanced several dollars per ton.

It will be remembered that the committee who last winter advised 6½ cents as the minimum price for common stoves, assured us that with iron at \$35 that price would be insufficient to be remunerative, and that they did not base the recommendation on the market price of iron at that time. The opinion is very confidently expressed that the cost of raw material and labor will not permit common stoves to be sold at a lower price than 6½ cents, if the manufacturer desires any profit on sales.

Within the last few years the style of stoves, cost of patterns, the introduction of nickel and other new elements of cost, have so changed the problem of cost that pig iron, which was once the principal factor, has now become of minor importance. The price of labor has constantly advanced and cannot be reduced. In view of these facts it is submitted that the prices recommended last winter be not changed.

The enormous immigration to our shores, the favorable crops, the financial prosperity, the general employment of labor, all warrant the belief that our trade will be very satisfactory this fall as to the amount of sales, and will be remunerative if our action at this meeting is wise.

A brief communication was received from Mr. A. Bradley, treasurer, announcing that the association had a small cash balance.

Mr. Sard called up his motion made at the last meeting, changing the date of the annual meeting from the first Wednesday to the second Wednesday in February. After some discussion the motion was carried.

The Chair appointed the following gentlemen a committee to prepare business for the next session of the association: Messrs. Perry, Jewett, Whitehead, Tefft and Sheppard.

The Chair introduced Mr. Joseph D. Weeks, Secretary of the Western Iron Association, who happened to be present, and asked him to give his views on the subject of the condition of the Western iron market. The invitation was acknowledged and responded to in a few remarks expressing the opinion that the changes of the past few months had given the Western market great strength. The recent transactions had been larger than ever before, except once, and it would be impossible to place an order for 1000 tons of foundry pig within \$2 per ton of the price of a month ago. Mr. Weeks gave many facts showing that the tendency of prices is upward, and that a strong market through the fall and winter months might be expected.

Mr. A. O. Kittredge, of New York, was then asked to read a paper, prepared by invitation of the Committee on Papers, on "Foundry Bookkeeping." This paper is one of great practical interest and value, which we shall take great pleasure in printing in full. We have secured the manuscript, but as the diagrams employed are needed for purposes of illustration, we shall not be able to publish the paper until we can have these diagrams carefully engraved. The paper is the work of an expert accountant, practically acquainted with foundry bookkeeping, and will be found to merit careful study. It is difficult to make such a paper of great interest for an audience, for the reason that any one but a practical bookkeeper finds it difficult to carry in mind the details of a comprehensive system of bookkeeping; but in print, when opportunity is afforded for careful reading and reference from one part to another, and to the blank pages of the account book ruled for the necessary entries, it will be found of great practical interest.

Mr. Sard said that the business of keeping foundry accounts was one but little understood by most persons in the trade, generally only by one person in a concern. He thought it probable that the excellent and thorough paper of Mr. Kittredge had not been perfectly understood by the meeting, but he was sure it would repay very careful study, and he moved a vote of thanks to Mr. Kittredge, with the request that he would furnish a copy of his paper for publication. This motion was carried with applause.

There being no business of importance to transact, the association adjourned to dine together at 2 o'clock and reassemble for business at 3 o'clock p. m.

Afternoon Session.

The president called the meeting to order at 3 o'clock, and the following additional names were handed to the secretary:

John Magee, Albert N. Parlin; Magee Furnace Co., Boston, Mass.
Henry S. Hubbell; Hubbell & Bro., Buffalo, W. L. McDowell; Liebrandt & McDowell Stove Co., Philadelphia, Pa.
A. J. Bricker; Ohio Stove Co., Tiffin, Ohio.

The committee on business, appointed at the morning session, reported as follows:

Mr. President and Gentlemen: The committee appointed to prepare the order of business for the action of this meeting respectfully report that, in view of the full consideration given at the former meetings of this association to the various collateral questions which relate to the business of manufacturing and selling stoves, they are unanimous in the opinion that the question of prices is all that is important to be considered at this time. This question must be decided strictly upon the grounds of the cost of producing our goods.

It is well known that iron has been sold in the past at prices that involved heavy losses to both the manufacturer and the importer. It is, however, needless to say that such a condition of the iron market could not long continue; certainly not at a time of great business activity and prosperity.

Those who have studied the market most carefully have believed that before the middle of September prices would materially advance, and that American foundry iron would become scarce in the market.

The committee, however, were not prepared for the advance that has at this early day already taken place; and if pretty universal reports on the subject are to be believed, they must come to the conclusion that a further advance will soon take place.

The committee further report that since our meeting in February last material advances have been made in the cost of labor in nearly every department, in the cost of fuel, lumber, sand, and, in short, of about every article that enters into the manufacture of our goods, and that this cost cannot be reduced.

The reports received from different sections of the country show clearly that the stocks of stoves in the hands of manufacturers are lighter than usual at this season of the year. This is due to the extensive strikes that have existed, and in some cases of long continuance, and to the unwillingness of many manufacturers to run their foundries with iron ruling at the prices of last winter.

While it is doubtless true that in some localities the crops have been injured, we must believe that the year of our Lord 1880 will be classed among those of the greatest abundance, and that there will be a reasonable foreign demand for our produce.

We are all aware of the unprecedented volume of immigration which has blessed our shores, adding gold to our wealth, and,

what is far more valuable, bone and sinew and willing workers to our resources of labor.

The universal employment of labor, and at good wages, is a most striking evidence of the general prosperity of the country. Mechanics and laborers are our great consumers; they spend their earnings liberally, and this largely increases the consumption of manufactured goods.

In view of the foregoing considerations, and of many others that might be mentioned if time permitted, your committee cannot doubt but that the business of the country is entering upon a season of unexampled prosperity.

It is well known that stoves have never advanced in price in proportion to the increased cost.

The basis fixed at our meeting in February last was at that time considered too low, and this has since been clearly proved by the increased cost of labor, &c., before referred to.

To secure to us such a reasonable profit as is due by the great risk involved in the business, and the enormous capital required for conducting it, this basis should be increased, and the country is enjoying a prosperity that would warrant it; but your committee are not prepared at this time to recommend it, yet they do most strongly recommend that the basis then adopted be now reaffirmed, and that no concession be made from the same.

(Signed) JOHN S. PERRY, SHERMAN S. JEWETT, W. H. WHITEHEAD, W. H. TEFFT, ISAAC A. SHEPPARD.

Adoption of report was moved and seconded. The chairman suggested that before the vote was taken he should be glad to hear a full and free discussion from the members present.

Mr. Mills apprehended that the demands of the country would be equal, if not in excess of the supply. He thought prices should be maintained and believed they would.

Mr. Hill, of New York: I believe the report of the committee covers the whole ground. Last winter when the prices were under discussion some suggested that they should be kept within reasonable bounds. Iron was high enough then to warrant a higher price for goods, yet many of us feared that iron might be lower. It was thought wise and prudent to adopt the prices then agreed upon. The cost of manufacture has increased since that date in many important particulars. I trust this recommendation of the committee will go out in such form that every one who buys and sells stoves can take it up and understand it. There is scarcely an idle man in the country at this time who really desires work. Hence, consumers are able and willing to pay a fair price for whatever they need. I fully concur in the recommendation.

Mr. Myers, of Cleveland: I am heartily in favor of the recommendation of the committee. I hope the meeting will endorse it fully, not merely assent to it. I feel that our branch of the iron trade has been very conservative, and I am very glad of it. I am glad stove manufacturers have pursued a conservative course. I am satisfied that the cost of manufacturing now is greater than when we were paying \$35 per ton for our iron. The price of iron in our section of the country is stiffening. Charcoal iron is \$3 @ \$5 per ton higher at present than it was 30 days ago. I hope, accordingly, that all present will endorse the recommendation of the committee, and carry it out in their business.

Mr. Filley, of St. Louis: I do not know that I can add anything to what has already been said. I fully endorse the report of the committee. I think that perhaps our prices are lower than they ought to be. I think the Western men will maintain prices if the Eastern men will maintain them. Iron is very likely to advance, but even without any advance, it seems to me, prices should be maintained.

Mr. Jewett, of Buffalo: My sentiments are fully embodied in the report of the committee to which we have listened. I think the stove manufacturers of this country, so far as we can see for this year, have the business in their own hands. By this I mean that with reasonable, fair and frank competition, prices can be maintained, our product can be sold, and a fair profit reaped. On the other hand, if the policy is to be pursued which has characterized some years in the past, prices will be unsettled and the year's trade rendered unprofitable, if not disastrous. Competition should always be friendly. Grasping competition is bad for all. I know of no business in the country that has been carried on with so much capital, and with so small a remuneration for that capital, as the stove business in the past few years. I am in favor of always selling as low as possible. I think the correct policy for us to pursue as manufacturers is to sell as low as possible. This course inspires confidence. Our firm is in favor of the recommendation of the committee and uniformity of prices. We shall endeavor to treat all fairly.

Mr. Sheppard next spoke in general approval of the recommendations of the committee.

Mr. Parlin said the New England manufacturers, especially the large ones, would sustain the basis.

Messrs. Castle and McDowell spoke to the same effect.

Mr. Sard discussed the subject at some length, showing why it was necessary to maintain the 6½-cent basis, and promising the hearty co-operation of Albany and Troy in an effort to make the trade remunerative.

Mr. Whitehead predicted that the demand for stoves this fall would exceed the supply, and therefore urged firmness on the part of manufacturers.

The report was then unanimously adopted by a rising vote.

Mr. Filley moved to reconsider the vote appointing the next winter meeting at New York. This led to considerable discussion, in which Mr. Filley, Mr. Whitehead, Mr. Tefft, Mr. Sard, Mr. Perry, Mr. Buck and others took part. The result was that the vote of the last meeting was reconsidered, and a motion fixing the February meeting in Detroit was carried by a large majority.

A vote of thanks to the proprietors of the Cataract House for courtesies and accommodations, and to *The Metal Worker* for published reports of the proceedings of the meetings, was then passed, and the association adjourned.

LABOR AND WAGES.

The coal miners at Straitsville, Ohio, held a meeting last week, there being between two and three hundred present. They decided to accept a reduction of 10 cents a ton; the price now being paid is 80 cents. They also adopted a resolution ignoring the action of the Inter-State Convention at Pittsburgh, whose resolutions were endorsed by the Ohio State Convention, as noticed in our last. This is a big concession on the part of the miners, but they claim to have been misrepresented by the delegates in the State Convention, and are now going to take matters in their own hands. Operators, however, state that they will not pay more than 60 cents per ton. No trouble is anticipated at present. Several of the mines have been shut down.

Another rolling mill firm in the Pittsburgh District is reported as having declared that it would employ no union men—the Kittingham Rolling Mill Co. This makes four mills—Scottsdale, Pa.; Wood's Mill at McKeesport, Pa.; Wellsville, Ohio, and Kittingham, Pa.

Some of the employees at Hubbard, Bawell & Co.'s ax works at Beaver Falls, Pa., struck last week against a 10 per cent. reduction.

The coal operators at Pittsburgh do not anticipate any general strike on August 1, at which time the demands of the Pittsburgh convention of coal miners are to be made. The *Labor Tribune*, on the other hand, says editorially: It appears from many quarters that the miners of bituminous coal will very generally make the demands recommended by the Pittsburgh convention. These demands are three in number: First, as to screens; second, as to store orders; and, third, as to restriction of output. The time set for enforcing the demands is August 1 next, and unless there shall be a compliance on the part of operators a determined strike will take place. There are other demands affecting localities, which though important to those immediately concerned are not so general as the three alluded to.

Another Boiler Heard From.—It had done faithful service, but instead of being placed upon the retired list it was patched up and set to work again. This is not the kind of treatment to which a self-respecting boiler is likely to submit, and the protest of this particular boiler against such oppression took the form of an explosion, which sent two men to their account with altogether undesirable suddenness. It was not the fault of the boiler that a result comparatively so small attended its effort. There was enough explosion, but for destructive purposes it was ill-timed. Had it happened a few minutes earlier or later, when the workmen were at their places, it would have been vastly more effective. The next boiler that undertakes to assert itself is rather more likely than not to do so at a time best adapted for doing the greatest amount of execution. That anything should be done to circumvent the murderous propensities of the common boiler is apparently past hoping for.

The Luminous Paint in Japan.—The trite aphorism, "There is nothing new under the sun," seems again exemplified by a statement to the effect that the Japanese were practically acquainted with the art of luminous painting nine centuries ago, thus anticipating the inventor of the supposed new phosphorescent paint. A Japanese cyclopaedia cites an account of a wonderful picture of an ox which left the frame to graze during the day and returned at night. This picture came into the possession of an emperor of the Sung dynasty (A. D. 979-998), who sought an explanation, which none of his courtiers could give. At length a Buddhist priest showed that a certain nautilus substance obtained from oysters, when ground into color material, rendered the pictures painted with the latter luminous at night and invisible through the day. The figure of the ox was painted with this phosphorescent pigment, and, becoming invisible by day, the superstition arose that the animal had gone out to graze.

Interesting figures which show where the islands and sand-bars in the Mississippi River come from have lately been prepared. From a series of daily observations extending from the early part of February to the latter part of October, 1879, taken at St. Charles, Mo., under the direction of the U. S. engineer corps, it has been ascertained that the average quantity of earthy matter carried in suspension past that point by the Missouri river, between one foot of the bottom and the surface, amounts to 14,858 lbs. per second, or 1,283,731,200 lbs. each 24 hours. The matter thus carried along weighs, approximately, 100 lbs. per cubic foot when dry, giving an average of 12,837,312 cubic feet of earth transported each 24 hours during the entire year, enough to cover one square mile to a depth of nearly 6 inches. During the months of June and July the average quantity per 24 hours amounted to 47,396,448 cubic feet; enough to cover a square mile to a depth of 1 foot and 8 inches. The maximum quantity observed for any 24 hours was on July 3,

when it reached the enormous amount of 111,067,200 cubic feet, sufficient to cover a square mile to a depth of 4 feet. These figures do not take into account the material that is held in suspension within the lowest foot of the depth, or that which is being rolled along the bottom. If these quantities could be ascertained within any reasonable limit of approximation to correctness, there is no doubt but they would show an amount far in excess of that which has already been determined.

Government Test Requirements for Boiler Iron.

The following are the amended rules relating to the method for ascertaining the ductility, &c., of boiler iron, issued by Mr. Jas. A. Dumont, Supervising Inspector General of Steamboats, under date of February 17th, 1880. The rule, No. 4, as amended, reads as follows:

"The manner of inspecting and testing boiler plates intended to be used in the construction of marine boilers, by the United States inspectors, shall be as follows, viz.: "The inspector shall visit places where marine boilers are being constructed, as often as possible, for the purpose of ascertaining and making a record of the stamps upon the material, its thickness, and other qualities. To ascertain the tensile strain of the plates the inspectors shall cause a piece to be taken from each sheet to be tested, the area of which shall equal one-quarter of one square inch, on all iron 5-16 inch thick and under; and on all iron over 5-16 inch thick the area shall equal the square of its thickness; and the force at which the piece can be parted in the direction of the fiber or grain, represented in pounds avoirdupois—the former multiplied by four, the latter in proportion to the ratio of its area—shall be deemed the tensile strain per square inch of the plate from which the sample was taken; and should the tensile strength ascertained by the test equal that marked on the plates from which the test-pieces were taken, the said plates must be allowed to be used in the construction of marine boilers; provided always, that the said plates possess the other qualities required by law, viz., homogeneity, toughness and ability to withstand the effect of repeated heating and cooling; but should these tests prove the marks on the said plates to be overstamped, the lots from which the test-plates were taken must be rejected as failing to have the strength stamped thereon. But nothing herein shall be so construed as to prevent the manufacturers from restamping such iron at the lowest tensile strain indicated by the samples, provided such restamping is done previous to the use of the plates in the manufacture of marine boilers. To ascertain the ductility and other lawful qualities, iron of 45,000 pounds tensile strength and under shall show a contraction of area of 15 per cent., and each additional 1000 pounds tensile strength shall show 1 per cent. additional contraction of area, up to and including 55,000 T. S.

"In the following table will be found the widths—expressed in hundredths of an inch—that will equal one-quarter of one square inch of section, of the various thicknesses of boiler plates. The signs + (plus) and - (minus) indicate that the numbers against which these signs are placed are a trifle more or less, but will not, in any instance, exceed one-thousandth of an inch. The gauge to be employed by inspectors and others to determine the thickness of boiler plates and the widths in the table, will be any standard American gauge furnished by the Treasury Department:

"All samples intended to be tested on the Riehle, Fairbanks, or other reliable testing machine, must be prepared in form, viz., 8 inches in length, 2 inches in width, cut out at their centers."

We may add that, as Mr. Dumont informs us, some manufacturers object to the rule because, under the ductility rule as now enforced, they are obliged to make the shells of their boilers from ¾ to 3-16 inch thicker than formerly, in order to get the allowance of steam which they want.

A French writer recounts the story of a lost train, which, starting from Marseilles, dashed on over the network of European lines, disappearing at last through a passage in the Ural mountains out on the Siberian plains that slope down to the North Pole. But now we have the true story of a locomotive lost on the rolling prairies of the West, in the search for which \$2500 has been vainly spent, the Kansas Pacific Railway, to which it belonged and from which it strayed, having abandoned the hunt. It appears that the line near Monotony, about 400 miles west of Kansas City, was visited by a veritable waterspout one day last week, and over 600 feet of track washed away. The deluge came along about 10 o'clock one morning, and in less than an hour the track was from six to eight feet under water. The country is high rolling prairie where the trouble came, and the storm was far more destructive than the one which caused the disaster at Kiowa Creek in 1878, at which time an engine was lost in a quicksand. This story was doubted in various quarters, but the loss of this second locomotive confirms it.

A patent has been granted for something new in the barrel hoop line. The hoop is made of wire bent so that it has a serpentine form. It is claimed this hoop, when driven upon a barrel or tub, will compress and hold the staves tightly together, like the ordinary stave hoop, but will have elasticity enough to stretch when the staves expand by moisture, and return to its former position when the staves again contract on becoming dry; in this way the hoops will adapt themselves to the expansion and contraction of the barrel and the annoyances of loose or bursting hoops will be avoided. By forming the corrugations to rest flatwise against the staves, no obstruction is offered to rolling in case of barrels, while a much greater amount of friction surface is brought to bear upon the staves, increasing their holding power. The ends of the wire are secured together by the twisting of one end around the other.

The Iron Age Directory

and Index to Advertisements.

Agricultural Implements.	PAOR
Grant Farm Mill and Cradle Co., Melrose, N. Y.	21
Air Compressors.	
Dayton Steam Pump Works, 14 and 16 Water st., Brooklyn, N. Y.	38
The Norwalk Iron Works Co., S. Norwalk, Conn.	35
Alarm Money Drawers.	
Tucker & Dorsey, Indianapolis, Ind.	10
Anti-Friction Metals.	
Reeves Paul S., Philadelphia, Pa.	35
Asphaltum.	
Fisher & Norris, Trenton, N. J.	24
Architectural Iron Work.	
Atina Iron Co., 86 Goeckel, N. Y.	6
Chamberlin E. & Co., Cleveland, O.	6
Asbestos Materials.	
The Chalmers-Spence Co., Foot 9th St., E. R., N. Y.	34
Asic Grease.	
Marian & Morgan Paraffine Co., Cleveland, O.	31
Asiles, Springs, &c., Manufacturers of.	
Hook R. & Sons, Winsted, Conn.	8
Hockley Guy C., Field & Co., 62 E. 14th, N. Y.	33
Lambertville Iron Works, Lambertville, N. J.	7
Sheldon & Co., Auburn, N. Y.	7
Wurster F. W., Brooklyn, N. Y.	38
Babbit Metal.	
Philadelphia Smelting Co., 12th and Noble, Phila.	31
Bag Holder.	
Spengler J. Jeff., Ashland, Ohio.	25
Barb Wire.	
Chicago Galvanized Wire Fence Co., 49 Chambers, N. Y.	20
Seut H. B. & Co., Buffalo, N. Y.	11
Thorn Wire Hedge Co., Chicago, Ill.	6
Bar Screws.	
Shelton & Co., Birmingham, Ct.	10
Bellows, Manufacturers of.	
Scott Geo. M., Chicago, Ill.	23
Bells (Steel).	
Sevin Bros. Mfg. Co., Easthampton, Conn.	32
Belted, Makers of.	
Alexander Bros., 412 N. 3d, Philadelphia	23
Forpaugh & Wright, 21 Front, N. Y.	13
McMillan Wm. & Bro., 113 South, N. Y.	13
Penfield Block Works, Lockport, N. Y.	25
Providence Tool Co., Providence, R. I.	21
Bicycles.	
Pope Mfg. Co., 55 Summer, Boston.	38
Bird Cages, Makers of.	
Jewett John C. & Sons, Buffalo, N. Y.	2
Lindeman O. & Co., 254 Pearl, N. Y.	3
Nashelmer John, 107 and 109 Pearl, N. Y.	3
Bit Braces, Manufacturers of.	
Backus G. S., 102 Chambers st., N. Y.	16
Millers Falls Co., 74 Chambers, N. Y.	21
Black, Tackles.	
McMillan Wm. & Bro., 113 South, N. Y.	13
Penfield Block Works, Lockport, N. Y.	25
Providence Tool Co., Providence, R. I.	21
Bolt Cutters.	
The Chalmers-Spence Co., foot 9th St., E. R., N. Y.	34
Bolt Cutters.	
Cleveland Machinery Dept., 125 Seneca, Cleveland, 24	
Sellers Wm. & Co., Phila. and 79 Liberty st., N. Y.	37
Wiley & Russell, Greenfield, Mass.	36
Bolts.	
American Bolt Co., Lowell, Mass.	9
Coleman Eagle Bolt Works, Philadelphia, Ind.	30
Indianapolis Machine and Bolt Works, Indianapolis, Ind.	30
Brass, Manufacturers of.	
Ansonia Brass and Copper Co., 10 Cliff, N. Y.	2
Bridgeport Brass Co., Bridgeport, Conn.	2
Brass Goods Mfg. Co., 41 Chambers, N. Y.	2
Brown & Bros., 81 Chambers, N. Y.	2
Davol John & Sons, 102 John, N. Y.	2
Holmes, Booth & Haydens, 40 Chambers, N. Y.	2
Manhattan Brass Co., 1st Ave. & 27th St., N. Y.	2
Merchant & Co., 207 Market St., Phila.	2
Plum & Atwood Mfg. Co., 50 Chambers, N. Y.	2
Rome Iron Works, Rome, N. Y.	2
South Mfg. Co., 241 Broadway, N. Y.	2
Waterbury Brass Co., 226 Broadway, N. Y.	2
Brass Founders.	
Reeves Paul S., Philadelphia, Pa.	35
Brick Presses.	
Miller S. P., 209 S. Fifth, Phila.	35
Bridge Builders.	
Mosley Iron Bridge and Roof Co., 5 Day, N. Y.	4
Bricks, Chain Pump.	
Croby A. D., 25 Peck Slip, N. Y.	3
Butcher and Shoe Nails, Manufacturers of.	
Wilson John, Sheffield, England.	10
Butte and Hines.	
American Spiral Spring Bt. Co., 82 Beekman, N. Y.	38
New England Bt. Co., Montpelier, Vt.	38
Sabin Mfg. Co., Montpelier, Vt.	38
Stanley Works, New Britain, Conn.	8
Union Mfg. Co., New Britain, Conn.	8
Calipers and Dividers.	
Stevens J. C., Chicopee Falls, Mass.	12
Carriage Builders.	
Shelton & Co., Birmingham, Ct.	10
Townsend Wilson & Hubbard, Philadelphia, Pa.	7
Carriage Hammers.	
Ives, Woodruff & Co., Mount Carmel, Conn.	10
Smith H. & Co., Plainville, Conn.	12
The E. D. Clark & Co., Auburn, N. Y.	12
Carriage Springs.	
Dexter Spring Co., Hulton Pa.	10
Car Axles.	
Robert A. & P. & Co., 265 S. 4th, Philadelphia.	5
Casters.	
Clark Geo. F., Windsor Locks, Conn.	12
Phoenix Caster Co., Indianapolis, Ind.	10
Castings, Iron.	
Cheney S., 101 Manlius, N. Y.	25
St. Louis Malleable Iron Co., St. Louis, Mo.	25
Casting Iron.	
Carver John, 41 North 3d St., Brooklyn, E. D., N. Y.	6
Chain, Makers of.	
Morton Thomas & Elizabeth, N. Y.	25
Chairs, Manufacturers of.	
Ruck Bros., Milbury, Mass.	10
Checks.	
Sweetland & Co., New Haven, Conn.	32
The E. Horton & Son Co., Windsor Locks, Conn.	32
Cider Mills.	
The New York Pile Co., 51 Beekman, N. Y.	24
Clock Springs, &c.	
Cary & Moen, 24 W. 20th, N. Y.	3
Dunbar Bros., 250 E. 14th, N. Y.	3
Coal, Makers of.	
Ely E. B. & S. W., New York.	29
Barb & Co., 54 Cliff, N. Y.	29
The Hoboken Coal Co., Jersey City, N. J.	29
Coal Hods.	
Griffiths Geo., Phila. Pa.	25
Coal Vases.	
Jewett John C. & Sons, Buffalo, N. Y.	2
Coal and Coke.	
Lane Brothers, Millbrook, N. Y.	38
Enterprise Mfg. Co., Philadelphia, Pa.	27
Coal, Water Fracture.	
Walter Francis, 230 S. Third, Phila.	27
Compasses and Dividers.	
Bemis & Call Hdw. Tool Co., Springfield, Mass.	30
Copper.	
Merchant & Co., 407 Market st., Phila.	27
Pope, Cole & Co., Baltimore, Md.	27
The New Haven Copper Co., 245 Pearl, N. Y.	2
Corn Huskers.	
Chambers, Bering & Quinlan, Decatur, Ill.	27
Corn Sheller.	
Goulding Curtis, Alliance, O.	26
Corrugated Iron.	
Mosley Iron Bridge and Roof Co., 5 Day, N. Y.	4
Countersinks.	
Barber D. E., 121 Washington, Boston.	30
Capulas.	
Smith & Sayre Mfg. Co., 21 Cortlandt, N. Y.	30
Cutlery, Importers of.	
Boker Hermann & Co., 101 Duane, N. Y.	26
Clatworthy E. & W., 81 Chambers, N. Y.	26
Friedmann & Lauterjung, 81 Chambers, N. Y.	26
Cutlery, Manufacturers of.	
Burkshaw Aaron, Peppercorn, Mass.	19
Greenfield Tool Co., Greenfield, Mass.	19
Henry Seymour Cutlery Co., 84 Chambers, N. Y.	19
John Russell Cutlery Co., 84 Chambers, N. Y.	19
Morden Cutlery Co., 49 Chambers, N. Y.	19
The Wm. Rogers Mfg. Co., Hartford, Ct.	19
The Lamson & Gooding Mfg. Co., N. Y.	19
Wallace Bros., Wallingford, Ct.	19
Dampers, Sinks.	
Detroit Iron & Brass Mfg. Co., Detroit, Mich.	29
Differential Pulley.	
Yale Lock Mfg. Co., 43 Chambers, N. Y.	29
Dinner Pail and Lantern.	
Haight John, Fortchester, N. Y.	38
Discount Tables.	
Jennings S. B., Deep River, Conn.	38
Door and Gate.	
Paune F. R., 35 Fulton, N. Y.	38
Van Wagoner & Williams, 81 Beekman, N. Y.	38
Door Bolts.	
Ives Robert B., New Haven, Conn.	23
Drilling Machines, Makers of.	
Bornton & Plummer, Worcester, Mass.	37
Polger A. E. & Co., Springfield, O.	37
Sellers Wm. & Co., Phila. and 79 Liberty st., N. Y.	37
Thorne, De Haven & Co., Philadelphia, Pa.	37
Vulley & Russell Mfg. Co., Greenfield, Mass.	37
Drills, Ratchet.	
Lathrop & Co., Newark, N. J.	36
Drop Hammers.	
Merrill C. & Sons, 556 Grand, N. Y.	36
Drop Presses, Makers of.	
Becher & Peck, New Haven, Conn.	34
Drop Tools, Makers of.	
Duscher M. & Co., Chambers, N. Y.	34
Electric Machines.	
Weston Lyman Electric Machine Co., Newark, N. J.	34
Electric Motors.	
Braunsdorf J. E. & Co., Pearl River, N. Y.	34
Elevators, Makers of.	
Crane Bros. Mfg. Co., Chicago, Ill.	94
Stokes & Parrish, Philadelphia, Pa.	35

Plane Irons, Manufacturers of.	
Ruck Bros., Milbury, Mass.	10
Greenfield Tool Co., Greenfield, Mass.	19
Planes, Manufacturers of.	
Greenfield Tool Co., Greenfield, Mass.	19
Lafin Mfg. Co., Westfield, Mass.	24
Stanley Rule and Level Co., 29 Chambers, N. Y.	24
Plated Ware.	
Hall, Elton & Co., 75 Chambers, N. Y.	11
The Wm. Rogers Mfg. Co., Hartford, Ct.	11
Plows.	
Norwegian Plow Co., Dubuque, Iowa.	11
Plumbers' Materials, Manufacturers of.	
Carr Wm. S. & Co., 102 Cliff, N. Y.	11
Everhart Jas. M., Scranton, Pa.	38
Pocket Knives.	
Boker Hermann & Co., 101 Duane, N. Y.	28
Potter & Kettles, Tea and Coffee.	28
Purvis R. C., Philadelphia, Pa.	21
Sundry Mfg. Co., Buffalo, N. Y.	21
Power Hammers.	
Diemel, Eisenhardt & Co., Phila., Pa.	16
Presses, Fruit and Vegetable.	
Stiles & Williams, 107 Plymouth, N. Y.	21
Mohawk & Hudson Mfg. Co., Waterford, N. Y.	21
Presses, Power, Makers of.	
Enterprise Mfg. Co., Philadelphia, Pa.	37
Merriman A. H., West Meriden, Conn.	37
Peckless Punch & Shear Co., 25 Day, N. Y.	37
Stiles & Farker Press Co., Middletown, Ct.	37
Pulley.	
Oesterline W., Cincinnati, O.	34
Penfield Block Works, Lockport, N. Y.	25
Providence Tool Co., Providence, R. I.	21
Pumps, Makers of.	
Douglas W. B., Middletown, Conn.	7
Gunnison A. B., Erie, Penn.	25
Hartford Compressed Air Pump Co., Hartford, Conn.	25
Philadelphia Hydraulic Works, Philadelphia, Pa.	37
Rumsey & Co., Seneca Falls, N. Y.	37
Rumsey L. M. & Co., St. Louis, Mo.	37
Union Mfg. Co., 26 Chambers, N. Y.	37
Rails, Iron and Steel, Makers of.	
Allentown Rolling Mill Co., Allentown, Pa.	4
Brooklyn Clay Retort and Fire Brick Works, Brooklyn, N. Y.	38
Howard & Morse, 45 Fulton, N. Y.	38
Miller Edw. & Co., 35 Warren, N. Y.	38
Rails, Steel, Makers of.	
Coles, H. H. & Co., Philadelphia, Pa.	12
Lawn Mowers.	
Lloyd, Supple & Walton, Philadelphia, Pa.	21
Levers.	
Onderdonk Robert, 405 Grand, N. Y.	10
Leveling Instruments.	
McKinnell & Constock, 27 Warren, N. Y.	38
Levers.	
Diston Henry & Sons, Philadelphia, Pa.	24
Locks and Keys—Manufacturers of.	
Richmond Lock, Broadway and Kosuth, Brook	2
Irvin E. D., 25 Centre, N. Y.	2
Brantford Lock Works, Brantford, Conn.	37
Crocker William, 6 Cortlandt, N. Y.	37
D. K. Miller Lock Co., Philadelphia, Pa.	37
Durrie & McCarty, 97 Chambers, N. Y.	21
Smith & Edge Mfg. Co., Bridgeport, Conn.	25
Smith & Edge Mfg. Co., Bridgeport, Conn.	25
Lubricator.	
American Lubricator Co., Detroit, Mich.	25
Machinery, Makers of.	
Bliss & Williams, 117 Plymouth, Brooklyn, N. Y.	36
Box Alfred & Co., 312 Green, Phila.	37
Crocker William, 6 Cortlandt, N. Y.	37
Crocker William, 6 Cortlandt, N. Y.	37
Foran S. C. & Co., Manchester, N. H.	34
Landis E. F., Lancaster, Pa.	34
McDonald J. C., Chambers, N. Y.	34
Lyon E. & Co., 470 Grand, N. Y.	36
Garvin E. & Co., 129 Centre, N. Y.	36
Mohawk & Hudson Mfg. Co., Waterford, N. Y.	21
Oram & Atterton, Cleveland, O.	36
Pittsburgh Mfg. Co., Pittsburgh, Pa.	36
Pratt & Whitney, Hartford, Conn.	36
Sellers Wm. & Co., Phila. and 79 Liberty st., N. Y.	37
Stokes & Parrish, Phila., Pa.	37
The Siles & Clark Press Co., Philadelphia, Pa.	37
Wetherill Robert & Co., Chester, Pa.	37
Wyoming Valley Mfg. Co., Wilkes Barre, Pa.	37
Machine Screws, Makers of.	
Fellows John, Williamsburg, N. Y.	36
Waterbury Mfg. Co., Waterbury, Conn.	2
Machinists, Tools.	
Blaisdell P. & Co., Worcester, Mass.	16
Bullard E. F., 14 Day, N. Y.	16
Hawthorn & Co., 121 Chambers, N. Y.	16
Geo. Place Machinery Agency, 121 Chambers, N. Y.	16
Harrington E. & Son, 15th St. and Pennsylvania	16
Gray Machinery Dept., 37 Day, N. Y.	16
Kline J. M. & Co., Waterford, N. Y.	16
Robinson Wm. & Co., 121 Chambers, N. Y.	16
Sellers Wm. & Co., Phila. and 79 Liberty st., N. Y.	16
Stockwell Screw Machine Co., Cleveland, Ohio	16
Malleable Iron Castings, Makers of.	
Hamer & Co., 121 Chambers, N. Y.	16
Ives, Woodruff & Co., Mt. Carmel, Conn.	10
Mallets.	
Penfield Block Works, Lockport, N. Y.	25
Manganese.	
Frederick Manganese Co., 41 Cliff, N. Y.	31
Manganese, Manufacturers of.	
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Meat Chopping Machinery.	
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Mechanics.	
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Goldsmith Moses & Son, Charleston, S. C.	2
Robinson Wm. & Co., 121 Chambers, N. Y.	16
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Phosphor Bronze Smelting Co., Limited, 208	2
Purves A. & Son, 208 South Penn, Phila.	33
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Peckham J. S. & M. U. Co., N. Y.	6
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Corlies & Co., General Paint Works.	6
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The Antiquity of the Spoon.

The use of our common table utensil, the spoon, is widespread, and its invention, as it appears, dates from remote antiquity. The form which we use at the present day—a small oval bowl, provided with a shank and flattened handle—is not that which has been universally adopted. If we examine into the manners and customs of some of the people less civilized than we—the Kabyles, for example—we shall find that they use a round wooden spoon. The Romans also used a round spoon, which was made of copper. We might be led, from the latter facts, to infer that the primitive form of this utensil was round, and that the oval shape was a comparatively modern invention. But such is not the case, for M. Chantre, in making some excavations on the borders of Lake Paladru, the waters of which had been partially drawn off, found, in a good state of preservation, wooden spoons which in shape were nearly like those in use at the present day, the only difference being in the form of the handle, which was no wider than the shank. The facustrine station where these were found dates back to the ninth century, and we therefore have evidence that oval spoons were already in use during the Carolingian epoch.

The Neolithic people used oval spoons made of baked clay. Several fragments of such have been found in the Seine, and M. Perault has also discovered a number in a Neolithic deposit in Burgundy. This gentleman found, in addition, a pot ladle. "The table-spoons," says he, "are elongated and exactly resemble the wooden spoons in use in our kitchens. Their bowls vary from 3 to 14 millimeters in depth." The portions of handles which he collected were too fragmentary to allow it to be determined whether or not they terminated in a flattened handle like the modern forms. It might be pertinent to inquire to what possible use a spoon could have been put in the reindeer age, when raw meat was eaten and when skin bottles were the only water vessels. Yet a genuine spoon, made of reindeer's horn, has been discovered in the Grotto of Gourdan. It is oval, very long and quite shallow. Its handle is very elegant, being covered with engraved figures. Unfortunately, it is broken so that it is impossible to say whether the handle was flattened. The slight depth of the spoon should not surprise us, for the men who made it knew neither soups nor sauces, and they could only have used it for the purpose of extracting the marrow from the long bones of large animals, or for eating the brains of the latter,

and for such uses depth of bowl was of small consequence.

M. Piette has likewise found other well-characterized spoons in deposits of the Reindeer age. One of these, more delicate, narrower, deeper and less elegant than the one just mentioned, was found in one of the lowermost strata. At a still greater depth in the same deposit he came across a thick, rudely-made spoon, which appeared never to have had any handle. It was made of rough-dressed bone, without polished edges, and its shape was oval. Before the invention of such an implement as a spoon, man of the reindeer age employed the spatula, and this is found at all depths in the Gourdan and Lortet deposits. M. Garrigan discovered in the Grotto of Alliat a fragment of reindeer's horn hollowed out in its whole length, and apparently designed for holding liquids; and similar utensils were found by M. Piette at Gourdan. These, however, were probably only temporarily used as spoons, the only genuine spoons which have been discovered being those described above, and which served as models for Neolithic man, who afterward appeared on the scene.

Edison's right to a patent for the invention of the quadruplex telegraph attachment is to be disputed by H. C. Nicholson, of Kentucky, who claims priority of invention.

The railway system of the German Empire was extended by 1102 miles in 1879. Of the new lines constructed during the past year, 793 miles were built by the State.

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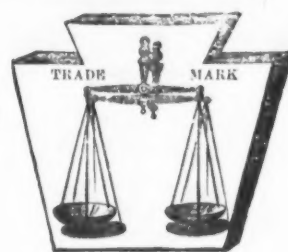


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Size of face, square

No. 1 2 3 4 5 6 7 8 9 10

Size of face, square

No. 1 2 3 4 5 6 7 8 9 10

Size of face, square

No. 1 2 3 4 5 6 7 8 9 10

Size of face, square

No. 1 2 3 4 5 6 7 8 9 10

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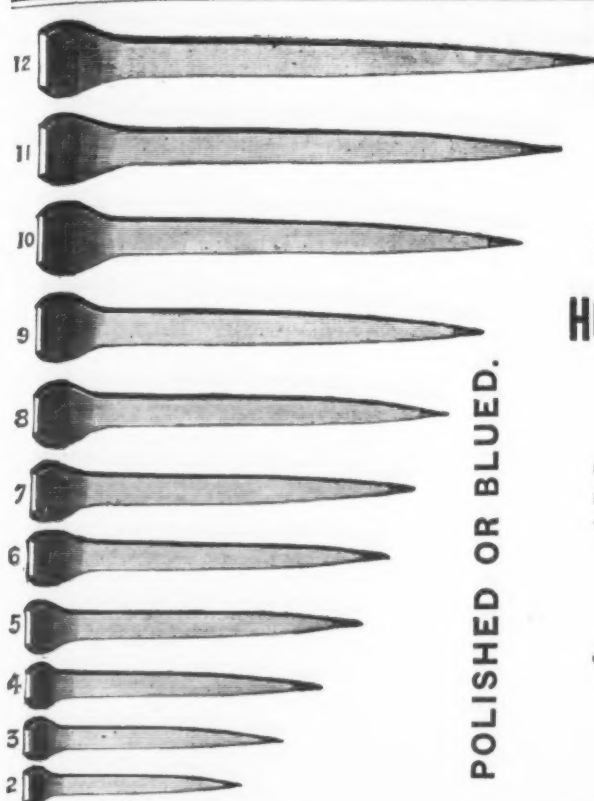
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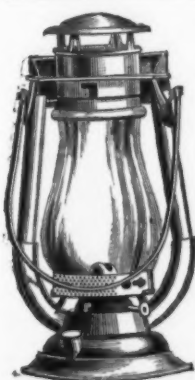
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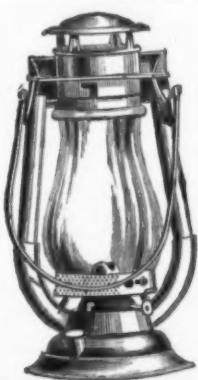
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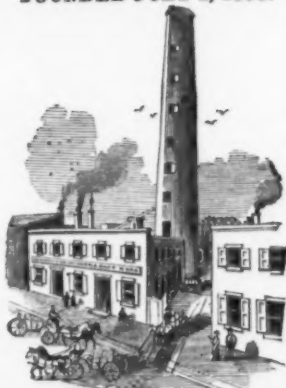
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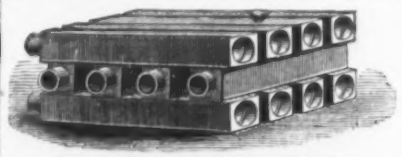
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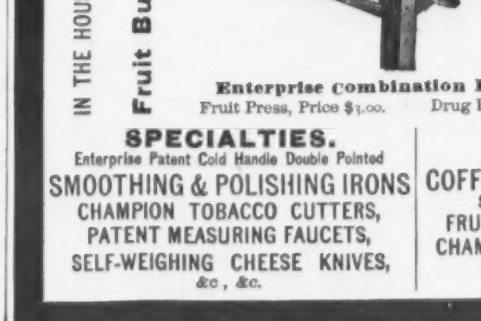
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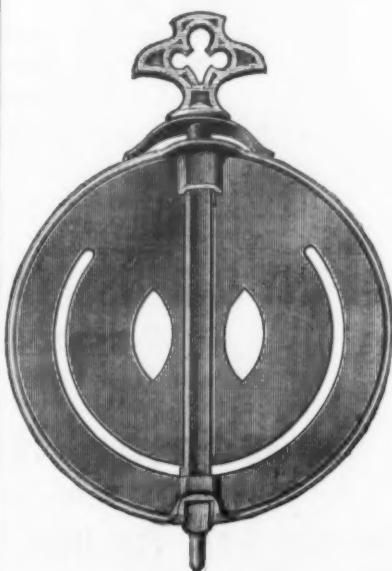
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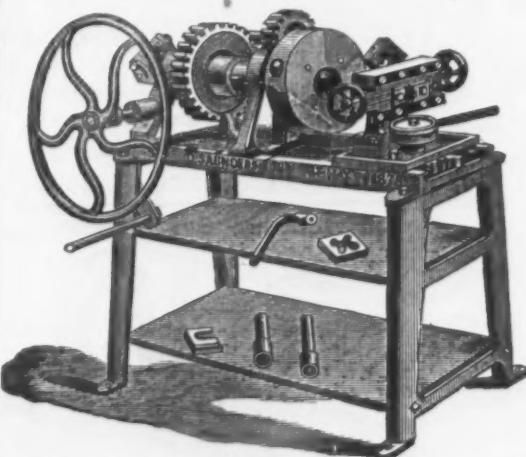


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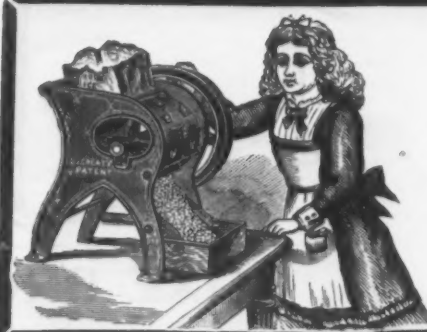
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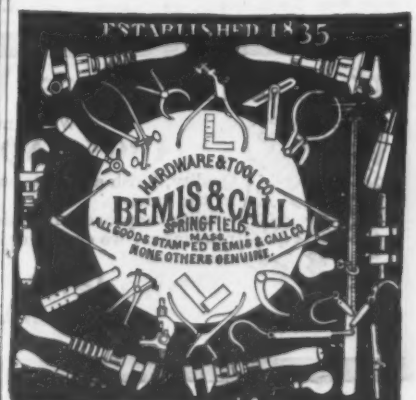
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M. D. Valentine & Bro
Manufacturers of
FIRE BRICK
And Furnace Blocks
DRAIN PIPE & LAND TILE.
Woodbridge, - - - N. J.

BORGNER & O'BRIEN,
Manufacturers
FIRE BRICK
AND
Edge Pressed Furnace Blocks,
CLAY RETORTS, TILES, &c.,
Twenty-third Street,
Above Race, PHILADELPHIA.
Twenty years' practical Experience.

PERTH AMBOY TERRA COTTA CO.,
Successors to
A. HALL & SONS, Perth Amboy, N. J.,
ARCHITECTURAL TERRA COTTA
AND
FIRE BRICK.
170 Broadway, NEW YORK.

Brooklyn Clay Retort
AND
FIRE BRICK WORKS.
Manufacturers of Clay Retorts, Fire Brick, Gas
House and other Tile, Cupola Brick, &c. Dealers in
and Miners of Fire Clay and Fire Sand. Clay bank at
Burl's Creek, New Jersey. Manufacture: Van Dyke,
Elizabeth, Richards and Partition Sts., Brooklyn, N.Y.
Office - No. 88 Van Dyke St.

Watson Fire Brick Manufactory,
ESTABLISHED 1856.
JOHN R. WATSON, Perth Amboy, New Jersey.
Manufacturer of
FIRE BRICK,
For Rolling Mills, Blast Furnaces, Foundries,
Gas Works, Lime Kilns, Tanneries, Boiler
and Grate Setting, Glass Works, &c.
Fire Clays, Fire Sand, and Kaolin for Sale.

HENRY MAURER,
Proprietor of the
Excelsior Fire Brick & Clay
Retort Works,
Manufacturer of **FIRE BRICK, HOLLOW**
BRICK AND CLAY RETORTS.
WORKS: PERTH AMBOY, NEW JERSEY.
Office & Depot, 418 to 422 East 23d St., N. Y.

TROY FIRE BRICK WORKS,
Troy, N. Y.,
JAMES OSTRANDER & SON,
ESTABLISHED 1848,
Manufacturers of
FIRE BRICK,
Tuyeres, Tiles, Blast Furnace Blocks, &c. Miners and
Dealers in Woodbridge Fire Clay and Sand, and Staten
Island Kaolin.

Established 1864.
GARDNER BROTHERS,
Manufacturers of
STANDARD SAVAGE FIRE BRICK,
TILE & FURNACE BLOCKS,
OF ALL SHAPES AND SIZES.
Clay Gas Retorts and Retort Settings, and
Miners and Shippers of Fire Clay.
Office: 116 Smithfield St., Pittsburgh, Pa.
Works: Mt. Savage Junction, Md., and Lockport, Pa.

HALL & SONS,
FIRE BRICK,
Buffalo, N. Y.

MILLER'S BRICK PRESSES
(Established 1844),
FIRE AND RED BRICK,
And Brickmakers' Tools in General.
SAML. P. MILLER & SON,
309 South 5th St., Philadelphia.

RUDOLPH FRANK,
Office, 229 FULTON STREET,
NEW YORK.
ALUMINA and
SILICA
FIRE BRICKS
Works,
BROOKLYN, on
the East River.
Through Cars, Canal Boats
and Vessels loaded direct from the
Works to all points.

PURE SILICA FIRE BRICK,
MADE BY THE
Landore Siemens Company,
Specially for OPEN-HEARTH FURNACES.

More "heats" obtained from them than from any other Bricks known.
Imported, to order only, by
PHILIP S. JUSTICE, Sole Agent in United States,
14 NORTH FIFTH STREET, PHILADELPHIA.

Common Sense Band Cutter,
A Perfect Tool, for Cutting and Removing Twine or Wire Bands from
Bundles of Grain Before Threshing.

The only Band Cutter that does not grasp several
straws with the band; that is absolutely certain in its
operations, and does not fatigue the hand. It will cut,
grasp and remove wire, string or paper bands by one
single movement. No squeezing, no chafed hands, no
blisters, no shears, no slow, hard work, and while
threshing it will pay for itself every hour.

EVERY FARMER MUST HAVE ONE
For use with his Self-Binder during the harvest, and
when threshing he can save all of the binding material.
Price \$2.00 per dozen, net.

Directions.—Push into bundle, pull out, and
by the same movement (or swing of the arm)
push point lightly against a board standing in a
box to discharge the band. The knife being
self-adjusting is always in proper position.
[For cutting off the ends of wire, push curved
end of knife with thumb, and pull the other
end with finger.]



UNIVERSAL
CORN HUSKER.

This Husker is superior to
any in the market, being ad-
justable to the hand, either
large or small. It is made of
solid brass; easy in the hand,
and can be used either with
or without gloves or mittens.
It is nicely put up in one-quar-
ter gross pasteboard boxes,
and is packed 20 boxes (5
gross) in a case. Price, \$24.00
per gross, net. In full case
lots, discount 25 per cent.



THE NEW CHARTER OAK LAWN MOWER.

For beauty, perfection, durability and popularity, "It
stands at the head of the list of Lawn Mowers, both in the
United States and Europe." The machine is mounted on
two large driving wheels or pulleys, and instead of being
on the outside of the frame, to run in the uncut grass like
other wheel mowers, they are placed inside of the frame
back of the cutting blades, running on a shaft each inde-
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either to the right or the left without injury to the sod, and
to be turned around in a circle no greater than its own
length, and cutting at the same time. For prices, address

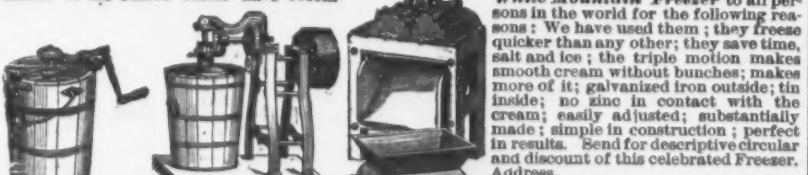
GRAHAM & HAINES, Agts., 113 Chambers N. Y. St.,

BRANFORD LOCK WORKS,
Ganymede Pattern Knobs.



Full size cut of No. 2564.
We have issued, under date of June 10, a complete revised Price List, a copy of which, with our
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illustrations and descriptions of over 1000 different varieties of Door Locks, Knobs and Escutcheons.
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SANDS' TRIPLE MOTION WHITE MOUNTAIN ICE CREAM FREEZERS.
THE WHITE MOUNTAIN FREEZER COMPANY are headquarters for Ice Cream Freezers and Ice
crushers, being the only firm in the United States who manufacture all parts of the raw material. The
Examining Committee, consisting of 50,000
dozens of the United States have recom-
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White Mountain Freezer to all per-
sons in the world for the following rea-
sons: We have used them; they freeze
quicker than any other; they save time,
salt and ice; the triple motion makes
smooth cream without lumps; makes
more of it; galvanized iron outside; tin
inside; no zinc in contact with the
cream; easily adjusted; substantially
made; simple in construction; perfect
in result. Send for descriptive circular
and discount of this celebrated Freezer.
Address,
White Mountain Freezer Co.,
Laconia, N. H., U. S. A.



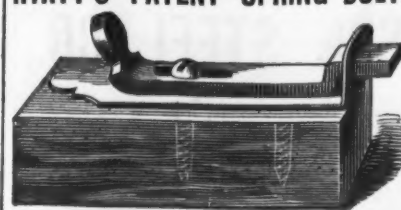
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Flour and Meal
SIFTERS.

Mixer, Scoop, Measure, Weigher, Egg Beater, Rice Washer, Tomato,
Pumpkin, Starch, Wine and Fruit Strainer.
The greatest combination known, and pronounced by press and public the only
first-class sifter in the world. Made better of better stock, sifts much faster, and
saves more material than all other sifters. Made in two sizes: No. 1, 3 pts; No. 2, 5
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J. M. HUNTER & CO., Sole Manufacturers and Owners,
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The SWEETLAND Combination
Universal, Independent and Eccentric.
Price List and description furnished upon application.
SWEETLAND & CO., Sole Manuf'rs.
126 Union St., New Haven, Conn.

CHUCK.

HYATT'S PATENT SPRING BOLT.



Patented Jan. 29th, 1878.
For Fastening Cabinet Ware, Closet and House Doors, &c.
We call the attention of the trade to these Wrought
Brass and Iron Bolts, as being the best and cheapest
in the market. Sizes, two inches and upward, both
plain and neck bolts. Two screws fasten the bolt
and bed-plate to the wood; no others are required;
the bed-plates are made of brass, from which the
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with an easy, elastic movement, saving expense of
screws and producing a strong, handsome and
cheap Bolt. Price list furnished on application.
BRASS GOODS MFG. CO.,
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We also manufacture all kinds of Brass and Tin
Goods, Drop Bases, Thimbles and Roses for Door
Knobs, Plate Escutcheons, Brass Labels, Patent Mirror
Business Cards, &c.

The Leading Wringer of
America.

SIMPSON & GAULT,
(Peerless Wringer Co.)

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CINCINNATI, OHIO.

PEERLESS
Clothes Wringers,
Sold by the Jobbing Trade everywhere.



Most Saleable Wringer in the Market.
TRY A SAMPLE ORDER.

Established 1838
Bevin Bros. Mfg.
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Manufacturers of
SLEIGH BELLS,
House, Tea, Hand,
Gong Bells, &c.
Bell Metal Kettles.

WESTON DYNAMO-ELECTRIC MACHINE
NICKEL.

The rapid increase in the use of Nickel-Plating
owing to the introduction of the Weston Machine
and the very low price of nickel material, enables us
to give greatly reduced estimates for complete
outfits.
We are furnishing outfits specially adapted for
Stove Work, giving a pure white deposit on plain
or mat surfaces.
Outfits complete, with Dynamo-Electric Machine
Tanks, Anodes, Solution, &c., &c., \$250.
We beg to refer to the following Sove Manufactur-
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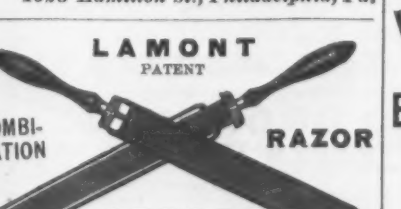
INFRINGEMENTS.
We call attention to infringements of the Weston
Machine, in which Automatic switches are used to
prevent change of current. The Weston Co. are owners
by grant or purchase of all forms of Automatic
Switches for Plating Machines. The adoption of these
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**Flanders' Improved Locomotive Cyl-
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Bar and screw of cast steel, with two extra cutter
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PATENT
RAZOR
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Manufactured by **COPELAND, HALL & Co.**
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No. 231 South Front St.,
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Pure White Lead, Red Lead, Litharge,
Orange Mineral, Linseed Oil,
AND PAINTERS' COLORS

Brooklyn White Lead Co.



White Lead, Red Lead & Litharge.
No. 182 Front Street,
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JOHN JEWETT & SONS
Manufacturers of the well-known brand of
WHITE LEAD.



ALSO MANUFACTURERS OF
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152 Front Street, NEW YORK.



The Atlantic White Lead
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MANUFACTURERS OF
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DUNBAR BROS.,
Manufacturers of
Clock Springs and Small Springs
of every description, from best Cast Steel,
BRISTOL, CONN.

W. & J. TIEBOUT,
Manufacturers of

Brass, Galvanized & Ship
Chandlery Hardware,

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ANOS \$195 to \$1600. Midsummer holi-
day offer. Illustrated, FREE. Address
JAMES F. SEATY, Washington, D. C.**

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 Terms, 30 days. For 60 or 90 days, interest added at 10 per cent. per annum.

Apples.
 Peter Wright's, 100 lbs. \$1.00
 Over 250 lbs. 100 lbs. \$1.00
 Eagle (American), 100 lbs. \$1.00

Apple Parers.
 Keystone Centennial, 1875. \$4.25
 Reading No. 72. 1877. 5.00
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 Rotary Peach Parer. 14.50
 Lots of 10 to 25 dozen special price.

Axes.
 Hunt's Kentucky and Yankee. per doz \$11.00
 Mann's Red Warrior. 11.00
 Richmond Chief. 10.00
 Borel's Axes. add 50c
 Double Bit Axes. net 22.00

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 Bate's "Vut Augers. \$10.40
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 Bonney's Pat. Hol. Augers, list \$10.40
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 Bevin Bros. Mfg. Co. Light Hand Bells. \$10.40
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 Connell's Door Bells. \$10.40
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Belt and Hiver's Hippers.
 Chambers No. 1. for 4 bolt. each, \$7.50
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 Best Proof Coil Chain—English. \$10.40
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 Landers, Fray & Clark, J. Russell & Co., Lamson & Goodnow Mfg. Co. and Hensell Cutlery Co., Manufacturers' prices net.

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 Hart Mfg. Co. \$10.40
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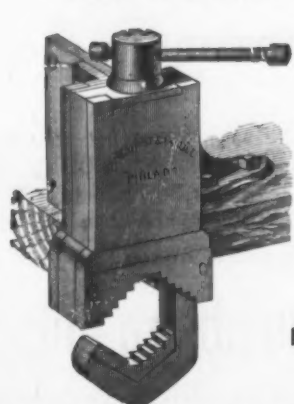
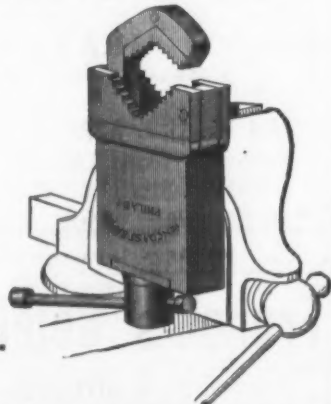
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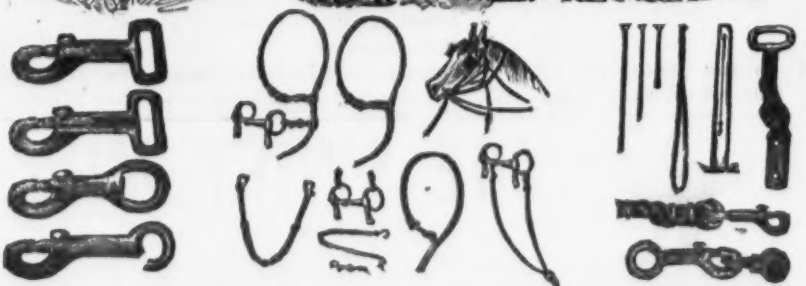
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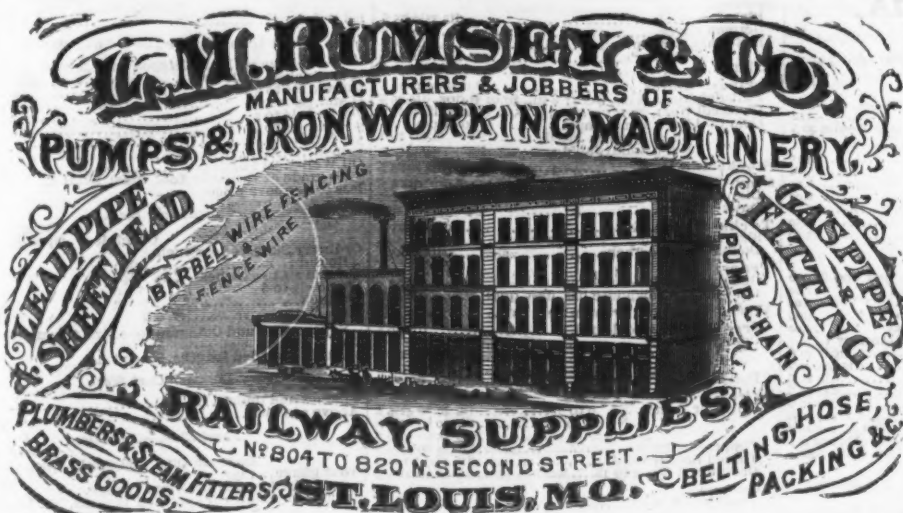
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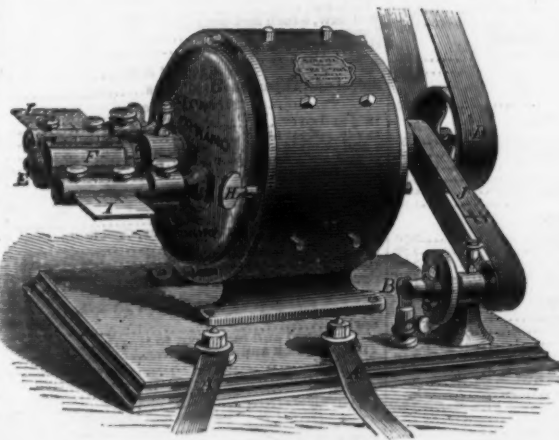
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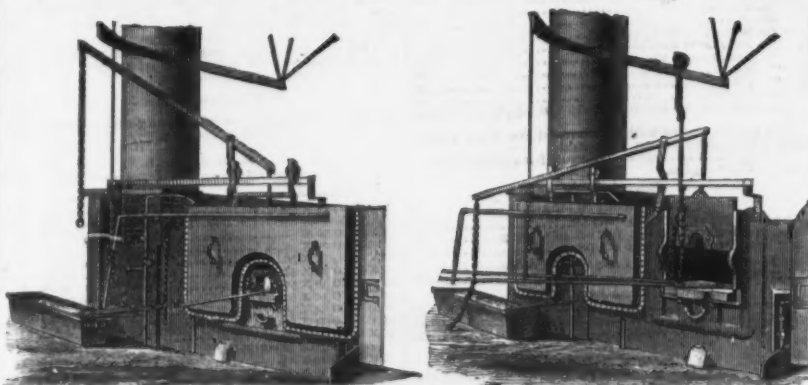
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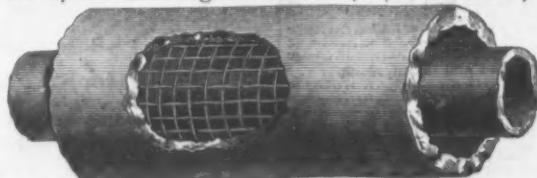
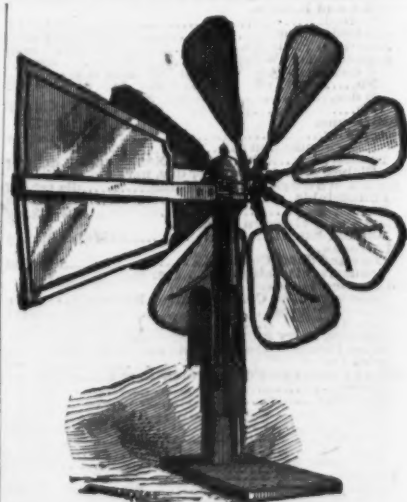
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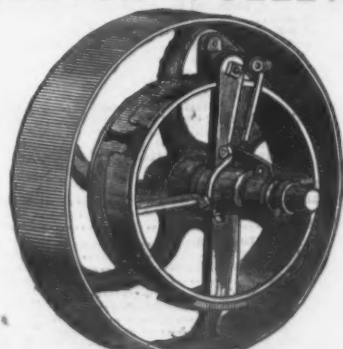
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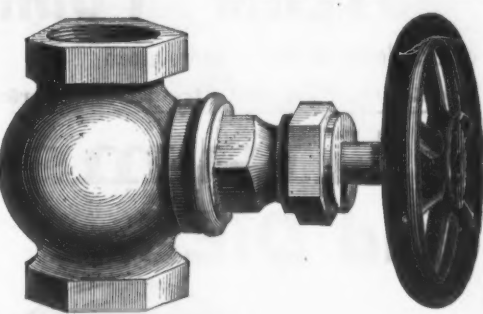
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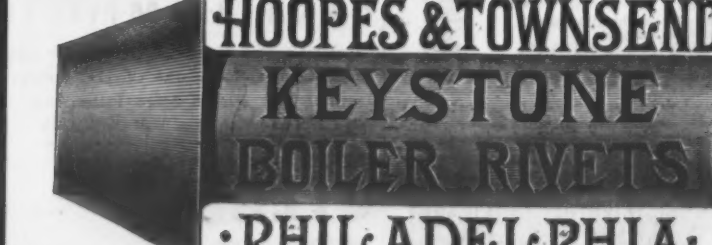

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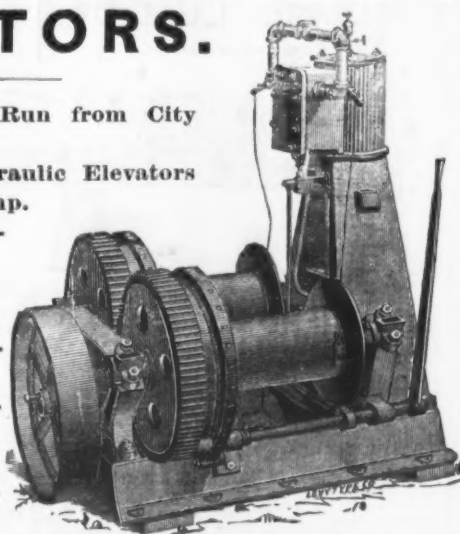
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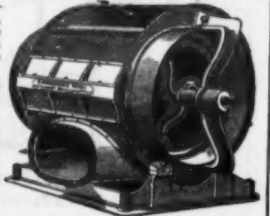
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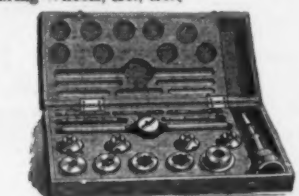


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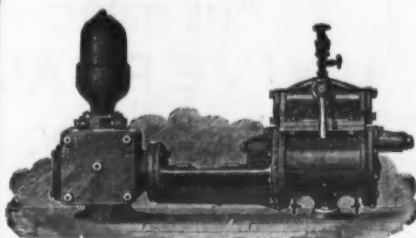
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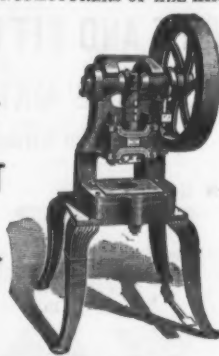
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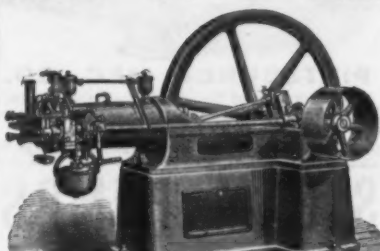
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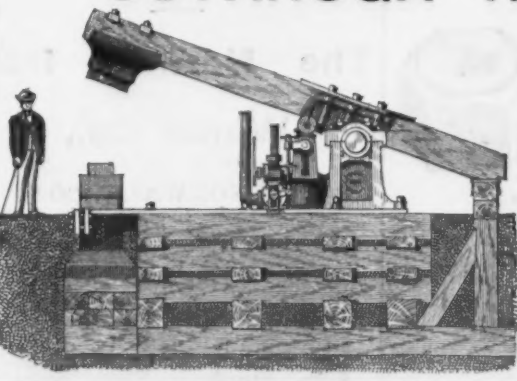
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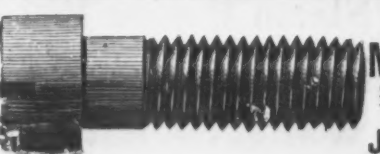
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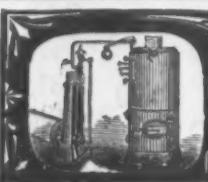
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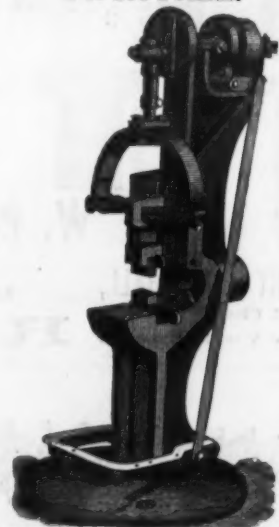
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3	43.00	45.00	3.10
3 1/4	47.00	49.00	3.30
3 1/2	51.00	53.00	3.50
3 3/4	55.00	57.00	3.70
4	59.00	61.00	3.90
4 1/4	63.00	65.00	4.10
4 1/2	67.00	69.00	4.30
4 3/4	71.00	73.00	4.50
5	75.00	77.00	4.70
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5 3/4	87.00	89.00	5.30
6	91.00	93.00	5.50
6 1/4	95.00	97.00	5.70
6 1/2	99.00	101.00	5.90
6 3/4	103.00	105.00	6.10
7	107.00	109.00	6.30
7 1/4	111.00	113.00	6.50
7 1/2	115.00	117.00	6.70
7 3/4	119.00	121.00	6.90
8	123.00	125.00	7.10
8 1/4	127.00	129.00	7.30
8 1/2	131.00	133.00	7.50
8 3/4	135.00	137.00	7.70
9	139.00	141.00	7.90
9 1/4	143.00	145.00	8.10
9 1/2	147.00	149.00	8.30
9 3/4	151.00	153.00	8.50
10	155.00	157.00	8.70

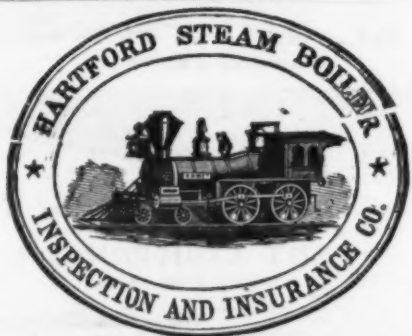
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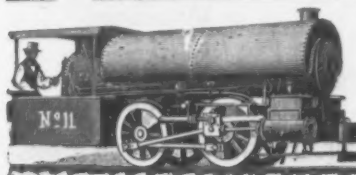
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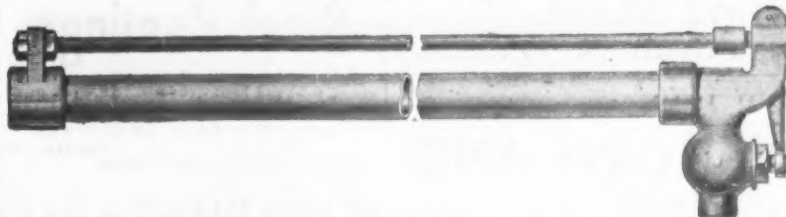
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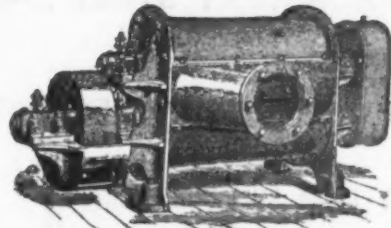
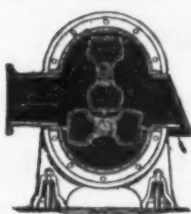
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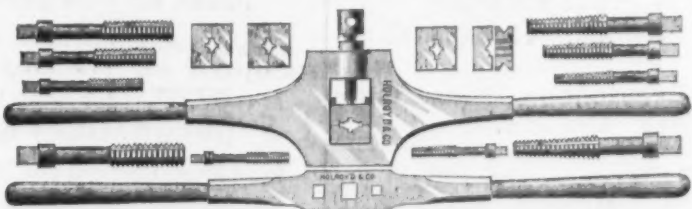
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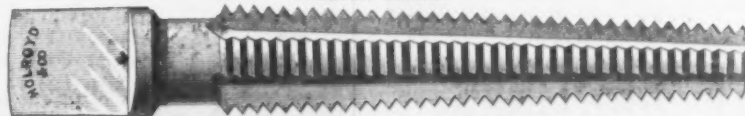
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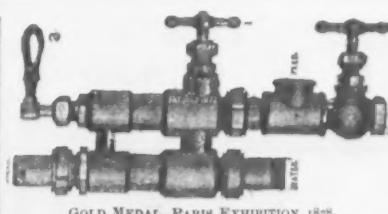
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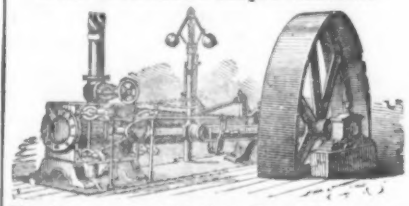
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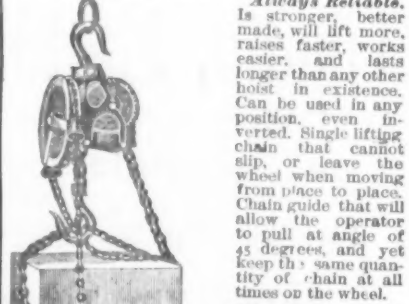
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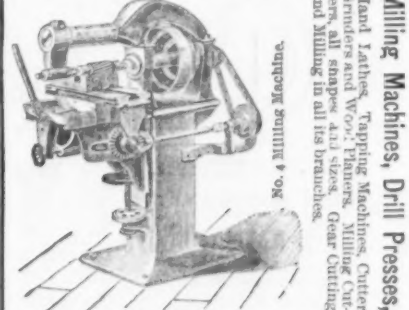
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